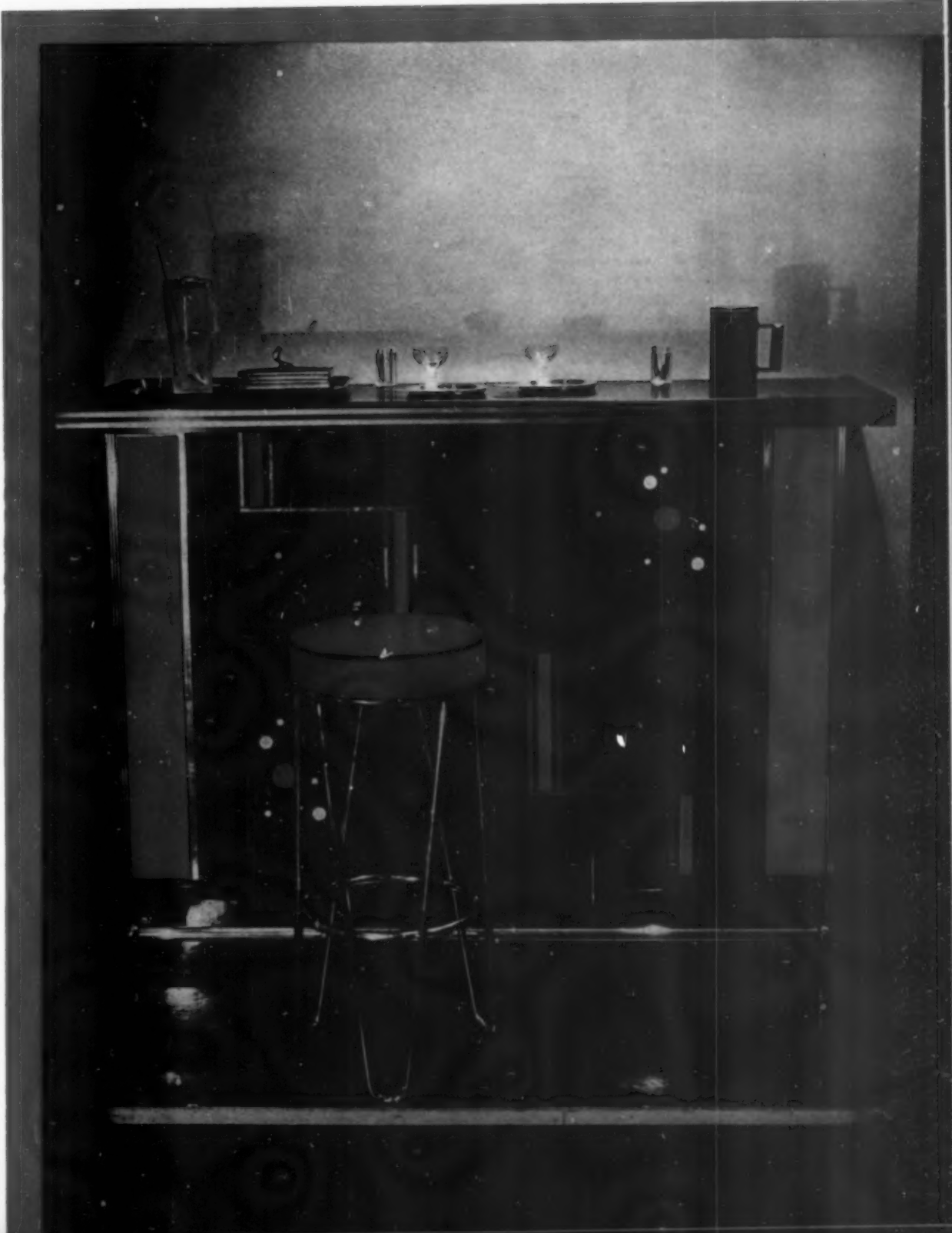


# *Plastic Products*



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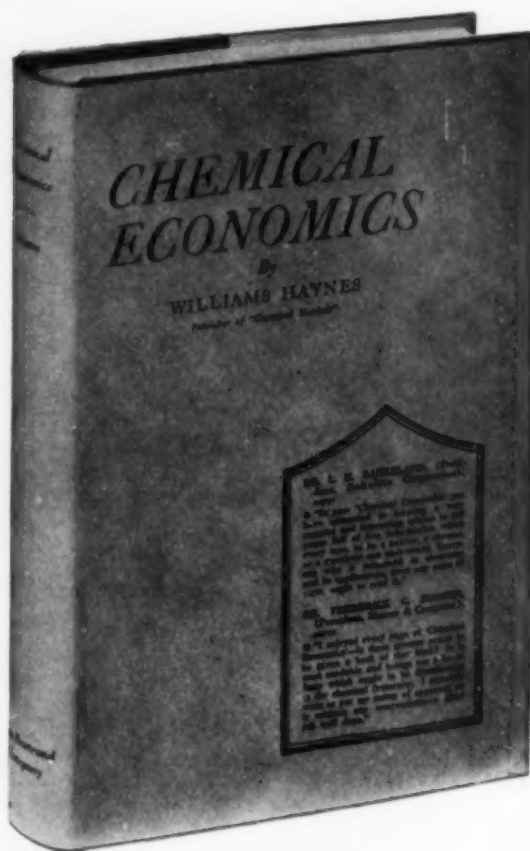
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# Plastic Products

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Volume X

Number 5



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# Plastic Products

VOLUME X



NUMBER 5

## Creating "Rackets"

**A**LTHOUGH the number of accidents in American industries has declined markedly, the amounts paid under workmen's compensation claims have risen sharply. This may be most quickly and cleverly proved by multiplying the man-hours worked a year by the lost-time accident hours and comparing this figure with the total of compensation losses expressed as a per cent. of the Department of Labor payroll index. Since 1926 the lost-time index has dropped from 100 to 22 while the compensation insurance payments have risen from 100 to 174.

Amendments to the original laws and sympathetic court decisions have stretched what was intended to be accident insurance into health insurance and even to unemployment relief and old age pensions. Far-fetched claims are recognized, the recovery period has been prolonged, and benefit awards have been largely increased. Prejudiced witnesses, unethical physicians, shyster lawyers, even unscrupulous local politicians are fast turning one of the most practical ways of relieving human suffering into a first class racket.

As a result this sound and useful social legislation is seriously threatened for many employers are

beginning to find that it is safer and cheaper for them to stand suit under the old employers' liability laws. Only the workmen will be the losers if this reversion to the old order becomes general.

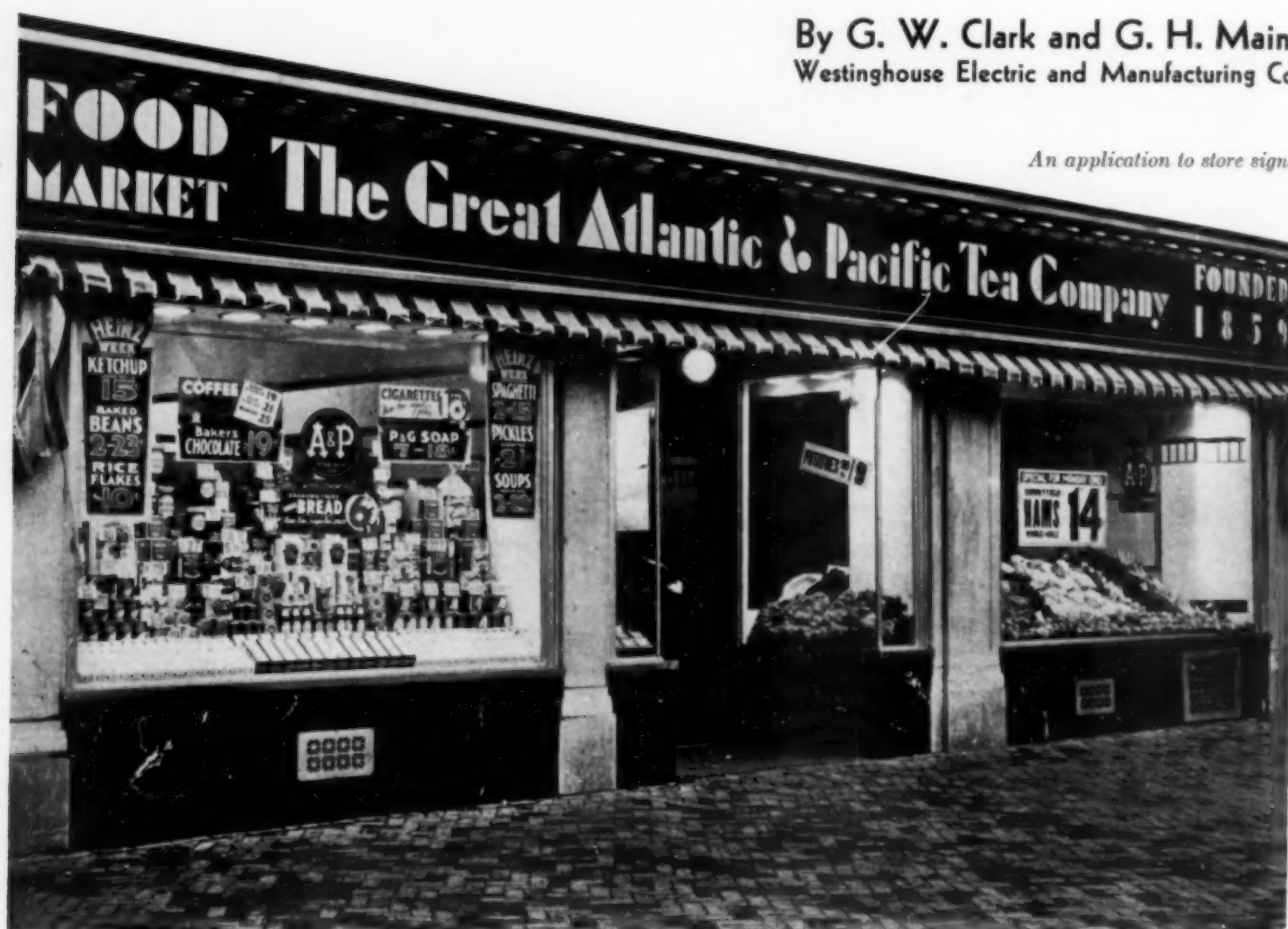
Thus we see exemplified the tendency of social laws for the protection or benefit of a single group in the community to become so prejudiced in administration that they defeat their original intent. Much of our New Deal legislation is of this kind and we should heed the recent example of similar movements in England and Germany where doles, compulsory collective bargaining with compulsory arbitration of labor disputes, maximum hours and minimum wages have led to revolts not only by the industrialists but also by consumers. The cutting of the English dole and abandonment of gold (a practical way of cutting wages) and in Germany most of the Nazi program are violent recoils from the class legislation passed while the Labor Party and the Social Democrats were in power.

Our industrialists are quite right in opposing vigorously similar tendencies on the part of our N. R. A. and A. A. A. and their proponents should not forget that the reaction in an elective government is prompt and violent.

# Embellishing Laminated with Colored Aluminum

By G. W. Clark and G. H. Mains  
Westinghouse Electric and Manufacturing Co.

*An application to store signs.*



**A**S THE visitor to the Century of Progress Exposition walked through the exhibits of the Westinghouse Electric and Manufacturing Company and of the Gulf Refining Company, his attention was struck by a series of large murals in rich metallic lustre colors on a black background which respectively depicted phases in the history of the electrical and oil industries. Close examination revealed that these murals had not been painted by an artist but consisted of colored aluminum molded into the surface of laminated synthetic resin panels. These murals are examples of a new type of decorative inlay which is beginning to find wide application. Other uses include soda fountains, bars and table tops and, in addition, provide distinctive signs, store fronts and show case trims.

As early as 1924, one of the authors had commenced experimental work on inlaying or molding metal foil on the surface of laminated materials. This work included tin, aluminum, lead and copper foils, also metallic coated papers, both plain and printed. These were either coated on one or both sides with a coating of phenolic resin and then molded as the surface or portion of surface

of a stack of phenolic resin treated paper or fabric sheets. Where a sufficiently heavy resin coating existed in the upper sheet of treated paper next to the metal, applying a resin film to the metal itself could often be eliminated.

Some promising results were obtained with this method.<sup>1</sup> However, except with some of the metallic coated papers, adhesion between the metal and Micarta proper was rather weak and sometimes non-uniform.

Considerable experimental work was carried on to improve this bond, and it was found that by suitably sand-blasting or otherwise roughening the metal surface and then preferably etching it, an undercut surface could be obtained into which the fibres and resin could be molded to give an excellent bond.<sup>2</sup>

This type of treatment was used for laminated metal combinations both where the metal formed the outer surface and where the laminated formed the outer surface with the metal as a supporting or backing member. One of the commercial decorative applications attempted was the inlaying of metal strips on laminated panels for water coolers. A number of different metals

were tried out, of which aluminum foil was well adapted to the molding process but failed to stand up well under weather conditions, exhibiting the characteristic discoloration in air experienced with aluminum.

In order to overcome these defects, anodized aluminum made by the Alumilite process<sup>3</sup> was tried out. The promising results obtained led to intensive development on this type of material.

### Advantages of Alumilite

It is well known that whereas aluminum possesses many advantages such as being soft, light, bright and non-staining for its usual applications, it also could find wider employment if some of its properties were modified. The Alumilite process provides these changes in aluminum. The soft and easily scratched surface is rendered very hard. The tendency of aluminum to acquire a dirty greasy film which finger marks and is imparted to objects with which it comes in contact is eliminated. For example, a piece of clean white paper rubbed against ordinary aluminum will pick up a dark smear whereas this will not be

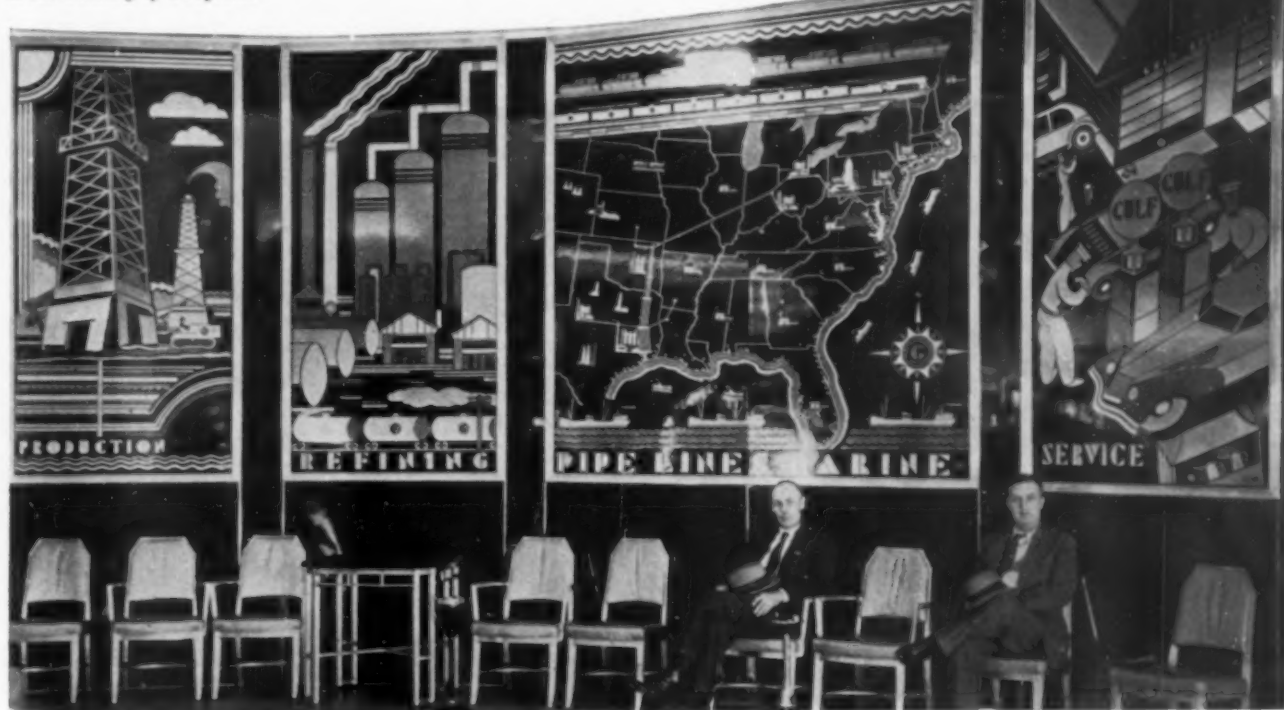
water line, while sample No. 4, Alumilite coated shows neither pitting nor staining.

All of these characteristics render the new product adaptable to many applications which are too severe for ordinary aluminum. Humidifier parts, nameplates, ice trays and various stamped, extruded and die cast pieces have been made from anodized aluminum. Certain applications may benefit also by the high insulating characteristic of the anodic surface, which has a dielectric strength up to 1000 volts per mil. when dry.

### The Process

In this process, refined grades of aluminum are first cleaned to remove any adhering grease or oil. The aluminum is then suspended as the anode in an electrolytic bath employing sulfuric acid and a modifying agent. Carefully controlled temperature, current density and concentration produce in a given time an aluminum oxide coating over the surface of the aluminum. The coating is at this stage highly porous and will readily adsorb dyes

*The striking inlaid murals in the Exhibit of Gulf Refining Company at the Century of Progress.*



obtained from an Alumilite surface. The characteristic color of aluminum may be replaced by any color desired and a lustre and depth of color are obtained which offer many decorative possibilities. Then, too, the resistance of aluminum to discoloration, staining or corrosion is greatly improved.

This process provides on aluminum a coating of aluminum oxide which is extremely hard and resistant to abrasion. In this respect it is similar to its near relative corundum. This property of high abrasion resistance is, of course, very desirable in many of its applications in laminated inlays where it is used on table tops, trays, and the like.

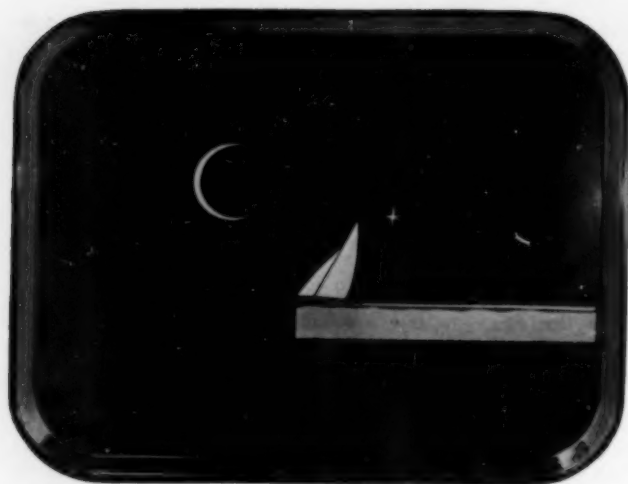
The protective effect of the Alumilite film against staining by tap water is illustrated in the photographs of samples subjected to 18 months immersion in tap water.<sup>4</sup> In this test samples of 2S aluminum (commercially pure grade), both bare and Alumilite coated were allowed to stand half immersed in water which was replenished from time to time to replace evaporation losses. This resulted in an increase in concentration of salts and sediment thus making the test more severe. It will be noted that sample No. 2, bare aluminum, showed staining, also a slight pitting at the

specially developed for this work. As the dyes penetrate into the capillaries of the coating, a real depth of color is obtained. If the aluminum has been well polished before anodizing, a high degree of lustre combines to give an unusual surface. When the desired color has been obtained, it may be locked in the capillaries of the anodic film by sealing these in the special Alumilite sealing bath. This develops too the high resistance to corrosion.

### Manufacture of Inlaid Micarta

To withstand the high temperatures used in molding laminated, to secure maximum bonding properties, and to obtain a surface matching well with the material itself, it has been necessary to develop special types of Alumilite films.

In laminated, made by molding colored papers and fabrics impregnated with phenolic or urea resins, a high background is provided for inlaying thin strips or cutouts of colored, anodized aluminum foil. The latter is embedded in the laminated in the molding process at 1000-2000 lbs. per square inch pressure and at a temperature of 120-200° C., according to the resin used.



*Inlaid laminated serving tray illustrating type of Alumilite inlays cut out with dies.*

Single-piece panels up to 4 feet by 8 feet in size are available. Larger panels can be built up by matching. The type of design may range from a simple name or a few lines in the pearly lustered plain Alumilite inlay on a black laminated background to an intricate mural in many colors. For narrow stripe work the metal foil for the inlay is cut on automatic power shears. Where a large number of pieces of the same design are called for, as for example, in the inlaid Serving Trays, it is economical to construct special dies to stamp out the metal. Otherwise considerable hand work is necessary in laying out and cutting.

For very narrow lines or where little or no space between the various colored metal pieces is specified, it is often desirable to make part of the inlay with the metal itself bearing a design in two or more colors. This is accomplished by printing the design on the anodized aluminum with the aid of a masking agent, and suitably treating to obtain various colors. Our preferred method is to anodize and dye the aluminum, print on a design with a masking agent, remove color from the unmasked portion, apply a second color if desired, seal, and then remove masking agent. The aluminum can be reprinted and recolored after the second color is applied, and before sealing in order to obtain a three color effect.

### Signs and Nameplates

The multi-color process just described is adaptable not only to the formation of designed inlays, but to signs, nameplates and decorated aluminum objects. In the case of the first two, sheet aluminum in thicknesses from .005" to .250" can be used. For the thinner sheets a suitable stiff backing material is necessary to give rigidity. Generally for small signs (up to 15 x 30 inches), we recommend the all Alumilite sign with 1/32" to 3/32" thick sheet aluminum. For larger signs Alumilite Inlaid Micarta is well adapted.



*Water cooler showing an early commercial application of Alumilite inlaid laminated material.*

### Limitations and Possibilities

The color films formed by the use of organic dyes are as a rule only slightly more fast to sunlight than the dyes themselves. They, however, give brilliant translucent films and are available in a wide range of colors. By careful selection of the dyes a line of colors entirely satisfactory for indoor applications has been developed. Certain sunfast colors also are available.

### Standard Colors

<i>Indoor</i>	<i>Outdoor</i>
Red	Blue
Orange Red	Yellow
Light Copper	Black
Copper	Plain
Brown	
Yellow	
Brass	
Green	
Light Blue Green	
Blue Green	
Blue	
Black	
Plain	

Of all the combinations, the uncolored Alumilite inlaid on black laminated offers, we believe, the most satisfactory material for both inside and outside service from the standpoint of efficiency, attractiveness and durability.

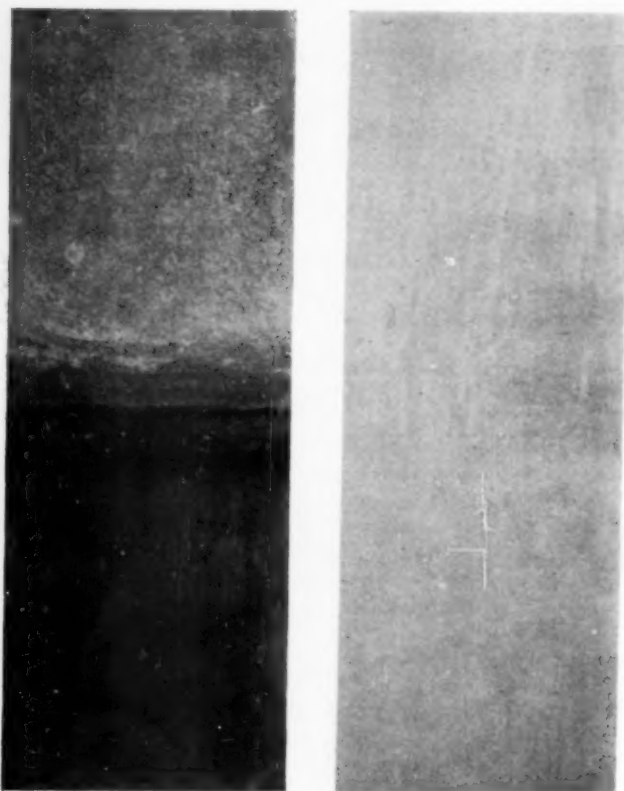
While this development is recent, it is rapidly growing in volume. Alumilite finishes and Alumilite inlaid laminated promise to open up a new and wide field for the architect, decorator and designer.

<sup>1</sup> U. S. Patent 1,809,984.

<sup>2</sup> U. S. Patent No. 1,844,512.

<sup>3</sup> The Alumilite process is based on a large number of patents controlled by Aluminum Colors, Inc., of Indianapolis, Ind.

<sup>4</sup> Photographs and data furnished by Aluminum Research Laboratories, Aluminum Co. of America.



*Alumilite protection against staining and corrosion. Samples immersed in tap water eighteen months. Left, sample 2, bare aluminum—stained and pitted. Right, sample 4, Alumilite coated—no effect.*

# Simple Cost Finding for a Molding Plant

By George K. Scribner  
President, Boonton Molding Co.

**T**HE National Recovery Act and its resultant codes outlaw "selling below cost". This, in effect, says that a manufacturer, therefore, must have definite knowledge of the operating cost of his business, and more especially the detailed product costs. This, in turn, leaves the plastic molder out at the extreme end of a limb in determining what is "cost," in view of the many debatable accounting factors which affect the results obtained.

No universal system of costs can be successfully worked out and adopted in the molding industry without many trials and tribulations, mainly because the larger units in the trade require much more detail than the smaller units. Accordingly no set system is available to serve the needs of both.

It would seem possible, however, to lay out the fundamental accounts of a system so simple that the smallest unit can use it with one bookkeeper, yet so comprehensive that the larger units, by expanding according to their needs, can use the same basic procedure.

The fundamentals involve a general ledger, purchase ledger, cash book, sales ledger and journal, with other subsidiary ledgers, if necessary, to meet particular needs. If a balance sheet and operating statement in proper detail, is taken off monthly, and is available not later than the middle of the succeeding month, the pertinent information can be laid down on comparative statements as a guide to management in controlling the operations and expenditures of the business, and make this information available for comparison with the budget, if a budget has been prepared.

For the simple, quick accounting system, let us lay aside the budget for the moment, even in the face of the outcry that is bound to come from the experts, and use the operating statements, promptly available and properly prepared, instead.

We realize that we must have a cost system which distributes the total operating expenses of the company in such a manner that these expenses can be correctly allocated over the main groups of products and to the individual products within each group. To be of any value at all the cost information must tie in with the general books of account. Arbitrary decisions that "we have 150% overhead in the molding department and 100% in the finishing department" will not do. The actual cost derived from such a system will be the basis for setting up sales prices, and these determine the amount of income to be derived from sales.

The figures to be used in estimating are to be taken from actual experience as determined from one month's operations covering the production of a sales volume we can reasonably hope to duplicate frequently, or we can safely hope to average. The use of any cost based on a production volume of more than normal expectancy, cannot be considered as representing real cost figures.

The estimating system will differ from the cost system only in that the cost figures will change every month—even with the

same sales volume—because of the variation in the type of parts flowing through the factory. The estimating system must be a safe average.

We give on the next page a listing of ledger accounts arranged in a sequence so that the first to come down give a logically arranged balance sheet and the final series, the operating statement. These accounts are chosen for the molding industry only. They can be skeletonized or expanded as the information becomes too detailed and cumbersome or too inadequate and incomplete.

It will be noted in this arrangement that the various reserves for depreciation are listed seemingly among the assets. This is done purely for convenience and clarity in reading the final statement. Actually they belong among the liabilities. The result, when listed as shown, is to list the total value, less the reserve, leaving a net value of each item showing clearly and directly among the assets, thus obviating the necessity of looking in another part of the statement and making a separate calculation to determine that which is important to the executive reading the statement, namely the residue of value in each account after the write off.

This whole arrangement undoubtedly would have some points which would be at variance with the existing procedures now in effect in each industry, but fundamentally is sound. This, however, has been done deliberately in the effort to get the simplest possible system both from the point of view of the man who reads the statement and also of the staff which keeps the books.

A set-up of this type can easily be closed out every month on absolutely accurate figures by taking a real physical inventory of raw material (molding compounds) and goods in process. The only approximation would come in using the sales value of the goods in process by which to price the inventory, less 20 per cent. on the total, no matter what condition the goods may be in. The attempt to figure actual amount of cost involved in each item depending on the degree of finish involved demands too much clerical work to pay.

From this operating statement a general overhead comes forth quite simply, giving an estimating sheet somewhat as follows:

Raw Material	Molding Overhead
Raw Material Handling Charge	Finishing Labor
Weighing or Pilling Cost	Finishing Overhead
Molding Labor	

**Equals** Total Manufacturing Cost  
Sales and Administration Cost

**Equals** Total Sales Cost  
Profit

**Equals** Selling price

All this can be done without any specific cost system. The molding labor is almost universally piece work today, together with most finishing, so the basic operating cost of any part can be checked daily from the individual piece work tickets. If a man earns his piece work the costs are all right, if not a change must be made.

The sales and administrative expense, usually expressed as a percentage of the sales price, not of the manufacturing cost, should really be titled "unallocatable expense". It consists of all the items that cannot logically be assigned to any particular production department. In the above simplified set-up we only recognize three of these departments or production centers, the raw material, the molding, and the finishing. All other expenses incurred and work done are contributing to the operation of one of these three, with the sales and administrative percentages left over and applied as a bulk factor over all.

A more elaborate cost system would break down the molding plant into a larger number of production centers than we have described, depending on the detailed information the executive wants and is willing to pay for. The usual practice is to start off with a very large number and gradually reduce by combining centers that continually show about the same ratio of indirect expense. A foot power kick press by way of illustration might carry about the same overhead in cents per hour as a hand filing bench; so with belt sanders and polishing wheels of equal horse power.

## The Balance Sheet

### Current Assets

1. Cash in Bank
2. Petty Cash
3. Securities—liquid
4. Accounts Receivable
5. Advances to Employees
6. Reserve for Bad Debts
7. Bills Receivable
8. **Inventories**—Raw Material
  9. Inserts
  10. Finished Goods (80% Sales Value)
  11. Miscellaneous Replacement (Repairable Returns)
  12. Packing Supplies
  13. Customers Molds (not yet billed)
  14. Coal
  15. Finishing Supplies
  16. Tool Room

### Fixed Assets

17. Land
18. Land Assessments
19. Real Estate, Buildings
20. " " Additions to Buildings
21. Reserve—Depreciation Buildings
22. Plant and Equipment
23. Reserve—Plant & Equipment Depreciation
24. Private mold inventory
25. Private mold depreciation and obsolescence reserve
26. Suspense Accounts
27. Furniture and Fixtures
28. Furniture and Fixtures Depreciation Reserve
29. Compensation Insurance prepaid
30. Other Insurance prepaid
31. Taxes—prepaid
32. Patents

The only thing to be watched carefully in a cost based on a percentage of direct labor is a change in the hourly rate or piece work level. Naturally if we have 160 per cent. overhead on molding labor and raise our wage level from 50 cents per hour to 60 cents we must refigure. This is not so bad as to lower the rates. Then all new jobs coming in automatically lose money because the overhead return is not sufficient to run the factory.

This cost system combines with production records and control and requires no extra clerical labor to operate. Each incoming order gets a sheet, or one sheet can serve for a piece with new orders merely separated by spaces. On this sheet are posted the pieces molded each day and the parts finished. Tickets from the finishing department are easily arranged, each carrying job, quantity, time, man, and easily posted.

Each molder has a ticket for each shift listing all the parts he is running, totals good and bad entered by inspectors, wages figured by office, all on one sheet. These are then assembled and at the end of the week become the pay voucher. No laborious copying need be done on a man card. The total amount for the week is entered on the individual man card for tax and record purposes only.

The fundamental, absolutely necessary record of the molding plant is the proper ledger set-up, easily accessible, arranged so it will produce the two important statements, balance sheet and operating, early in the succeeding month. The overhead percentages derived are admittedly not accurate but they are real and safe. By way of illustration, the finishing department has wide ranges of indirect cost on its various operations, for example from a possible 16 cents per hour on bench inspection up to 55 cents per hour on polishing, but a real average taken from a definite statement is far safer than a guess based on what the sales department announces they can get for the part.

### Current Liabilities

101. Accounts Payable Trade
102. Accrued Payroll
103. Accrued Taxes
104. Accrued Interest
105. Notes Payable

### Fixed Liabilities

111. Mortgage
112. Preferred Stock
113. Common Stock
114. Surplus
115. Dividends

### Operating Statement—Income

201. Merchandise Sales
202. Mold Sales
203. Discounts on Purchases
204. Interest on accounts receivable
205. Non-operating revenue
206. Royalties

### Expense

300. Merchandise Credits
301. Raw Materials
302. Inserts
303. Freight, Cartage and Express Incoming
304. Molding Wages—Direct Labor
305. Finishing Wages " "

### Manufacturing Overhead

306. **Wages**—Superintendence
307. Machine Shop
308. Non-Productive
309. Power
310. Weighers
311. Inspectors
312. Packing and Shipping
313. Heat, Light and Power
314. Plant and Equipment Repairs and Replacements
315. Machine and Tool Supplies
316. Mold Repairs
317. Finishing Supplies
318. Shop Expense
319. Packing Material

### Sales Expenses

325. Salaries
326. Sales Expense Miscellaneous Account
327. Travelling Expense
328. Research and Development
329. Advertising
330. Commissions
331. Freight, Cartage and Express Outgoing

### Administration Expense

335. Officers' Salaries
336. Office Salaries
337. Stationery and Printing
338. Auditing
339. Postage
340. Legal Expenses
341. Telephone & Telegraph
342. Office Expenses
343. Discount on Sales
344. Interest Payable
345. Compensation Insurance
346. General Insurance
347. Taxes, Real and Personal
348. Bad Debts
349. Outside Labor
350. **Depreciation**—Buildings, and Real Estate
  351. Plant and Equipment
  352. Molds
  353. Furniture and Fixtures
354. Charity
355. Patents
356. Pensions
357. Federal Revenue Taxes



# Interpreting A. S. T. M. Standards For Electric Insulation Molding Materials

By Francis A. Westbrook, M. E.

**T**HE American Society for Testing Materials recently developed a set of standards for testing molded insulating materials which are of great importance. All plastics used in the electrical industry must meet the conditions of the service in which they are used, and instead of leaving such matters as mechanical and electrical strength to chance, or the wasteful methods of trial and error, it is much more to the point to test the raw material. This is the modern way. Now that uniform standards exist whereby different materials may be tested under similar conditions and in a manner which experience has shown will give the information needed, it is possible to make direct comparison between the properties of different plastic compounds. Thus it becomes possible, in addition, to select that material which is best suited to any given set of conditions. For instance, of two materials one may have great mechanical strength and low dielectric strength, or low resistance to puncture by the voltage to which it is subjected; the other may have high dielectric strength and not so great mechanical strength. There might be a third material having both of these qualities in high degree but more costly than either of the others. It is perfectly possible that only one of the properties is needed to more than an ordinary extent so that one of the cheaper materials may be used. This might apply in a radio set where a fairly high voltage must be insulated against but where there is no particular need of mechanical strength. On the other hand the cap for the distributor of a gas engine ignition system might conceivably need to be strong mechanically and also of high insulating quality.

There are, moreover, several mechanical and electrical characteristics which are of importance to know. For instance, as regards mechanical strength, there is the amount of pulling the material can stand, or the amount of twisting, how much of a blow it can stand without breaking, to what extent its shape is distorted by heat or how much moisture it will absorb. On the electrical side there is the question as to how many volts it takes to puncture a given thickness of the plastic compound, what resistance it offers to the flow of current through it or across its surface, between terminals imbedded in it.

As the methods of testing are written in extremely technical language they are explained below in a more simple manner in the following paragraphs for the benefit of those not particularly versed in the terminology of engineers but who are interested practically in knowing about them. In fact it is altogether probable that almost all users of plastic products for the manufacture of electrical equipment of any kind would benefit by at least understanding the meaning and purpose of these standards whether they actually make the tests or not. Somebody should make such tests and the buyer and fabricator of the material who can discuss them intelligently is likely to make correspondingly more intelligent purchases.

The tests laid out here cover tensile strength, compressive strength, flexural strength, dielectric strength, distortion under

heat and water absorption. These are the qualities which most frequently should come under scrutiny.

Tensile strength is the first test. This is to determine how much of a pull the molded material can stand before it breaks. Such tests are made in machines designed for the purpose and there are many satisfactory ones available. The proper shape and dimensions of the piece to be tested are set forth in the standards and this applies to all tests of this kind so that when different kinds of molded materials are used the tests may be compared directly with each other. The manner in which the test pieces are held in the machine is also specified. Both hot-molded and plastic cold-molded pieces must be similar in shape and size and be held in the testing machine in the same way. The standards do not apply to inorganic non-plastic cold-molded materials for which another set is now under consideration.

Several conditions under which the tests are to be made are specified. Five are to be tested so as to avoid anything which is not average. The pieces must be dried for 48 hours in an oven at a temperature of 122 degrees F. with an allowable variation of 9 degrees above or below this figure. After this drying the material must be cooled down to room temperature (about 68 degrees) in an enclosed vessel (called a dessicator) in which the air is kept dry by some chemical which absorbs moisture. This is necessary in order to prevent the pieces from again taking up moisture as soon as they are removed from the oven. There are two other conditions under which the tests must be made. One is that the temperature of the room must be approximately 68 degrees F. and the other the rate of speed at which the pull is applied by the machine to the piece being tested. It must be slow and such that the machine head which moves in applying the pull does not do so more than .05 in. per minute when running idle.

In reporting on the results of the tests for tensile strength there are five items, as follows:

1. The load in lbs. at which the break occurred.
2. The width and thickness of the piece where smallest. This, of course, is standard and the same for all the pieces, but there are slight variations between pieces which must be taken into account to get the proper results which can be compared with each other. From this the area of cross-section of the piece is easy to calculate, and dividing this into the number of pounds of pull at which it broke we get the breaking strength in pounds per square inch.
3. This breaking strength in lbs. per sq. in. is the third item of the report, based on the minimum cross-section of the test piece.
4. The kind of material tested is given as the fourth item, which includes the location of the break with respect to the smallest cross-section of the piece and a description of the break itself—that is whether it shows any imperfection of the material, etc.

5. Finally, the speed at which the load was applied should be given.

With all this information relating to tests on several different kinds of molded insulating material it is not hard to make comparisons that mean something.

The second series of tests is to determine the compressive strength of the material, or, in other words, the amount of pressure which it can stand without crumbling or cracking. The molded pieces to be used for this are cylindrical in shape,  $1\frac{1}{8}$  in. in diameter and  $1\frac{1}{4}$  in. high. As in preparation for the tensile strength tests the pieces must be dried for 48 hrs. in an oven at approximately 122 degrees F. and cooled down to room temperature. Five pieces, or specimens, are tested so as to get average results. In addition to this tests must be made at higher temperatures depending on the temperatures at which the material is to be used in actual service. That is, if the plastic material is to be used under conditions where it will be subjected to heat, it should be tested for compressive strength at that temperature and probably at a somewhat higher temperature as well to determine just what it will do if conditions should vary. Perhaps another test at a lower temperature will also be advisable. These will of course have to be decided upon in each individual case, and experience will be likely to have a good deal to do with it. At any rate five specimens must be tested at each temperature so as to get a fair average. In this case, also, the load, or pressure, must be applied very slowly, not faster than .05 in. per minute. The report must state the following:

1. The size of each test piece.
2. The pressure on each at the first indication of breaking down.
3. The breaking pressure in pounds per square inch found by dividing the above pressure by the cross-sectional area in square inches.
4. The kind of material tested including a description of how it acts when it begins to fail—crumbling, cracking, etc.
5. The rate of speed of the application of the pressure, and how it took before failure took place.

We now come to the test for flexural strength, or resistance to torsion, or twisting. For this purpose pieces 5 in. long,  $\frac{1}{2}$  in. thick and  $\frac{1}{2}$  in. wide are used. They must be held in the machine so that the distance between the points of support are 4 in. apart. The twisting must be applied half-way between these supports and in the same direction and parallel to that in which the molding pressure was applied. The edge of the piece by which the twisting is applied and which is in contact with the piece being tested must be rounded with a radius of  $\frac{1}{8}$  in. so that there will be no cutting action.

In addition to this the test pieces must be dried and brought back to room temperature in a dessicator as already explained and further tests at higher temperatures must be made if conditions call for it, as previously explained. The same requirements are made as to the speed of applying the twisting pressure.

In reporting the results of the tests the following points must be covered:

1. The thickness and width of each piece as measured by a micrometer. In all of the tests these measurements are made for the purpose of taking into account the slight variations existing between different test pieces.
2. The twisting load in pounds at which the pieces first show signs of giving way.
3. From the two foregoing figures the pounds per square inch at which failure takes place is calculated from the following formula:

$$S = \frac{3PL}{2bd^2}$$

where S is lbs. per sq. in., P is the pounds of applied load, L is the distance between supports in inches, b is the width of the test piece in inches, and d is the thickness of the test piece in inches.

Another physical test which is important is the one devised to determine the amount of distortion of shape which a given

molded material will undergo under the influence of heat. A special apparatus has been devised for this test. Test pieces, one at a time and similar in all respects to those used for the twisting tests just described, are placed on steel supports 4 in. apart. A pressure of 5.5 lbs. is applied at the center of the piece. Provision is made for measuring the bending of the piece under this light load as the temperature is gradually raised. The temperature at which the amount of bending, or deflection, measures .01 in. is called the distortion point and is the measure by which the distortion due to heat is compared as between different materials.

The apparatus for making these tests is shown in a drawing in the standards, and is arranged in such a way that the test piece is in an air space surrounded by an oil bath in which the temperature is raised gradually, the rate not exceeding 1 degree every 2 minutes. Three test pieces of each material must be tested in this way to secure a proper average.

The report on this test must include the following:

1. The width and thickness of each piece measured by a micrometer at the center, in inches.
2. The distortion point in degrees F.
3. The length of time it takes before the distortion point is reached.
4. Remarks relating to the behavior of the test pieces during or after the tests.

The amount of water which a molded material used for electrical insulation absorbs is of course very important because the presence of water, or moisture, naturally affects the insulating quality of the material very greatly. For this reason the water absorption test has been included among the standard tests. It is simple enough to make and calls for only a good chemical balance, an oven which will maintain an even heat of 21 degrees F. and a beaker of water kept at 77 degrees F. The test pieces, or specimens, must be in the form of discs 4 in. in diameter and  $\frac{1}{8}$  in. thick for hot-molded materials or  $\frac{1}{4}$  in. thick for cold-molded materials. Three specimens of each material must be tested.

Tests are made in the following manner: Each specimen is weighed at room temperature, about 68 degrees F., and is then placed in an oven to dry for 24 hours. If the material is of a kind which softens easily under heat the temperature in the oven should not be more than 122 degrees F., or it may be placed in a dessicator, or closed vessel containing a moisture absorbing chemical at room temperature. Where a molded material does not soften under heat the specimens should be placed in the oven for 24 hours at 212 degrees F. After they have been taken out of the oven, in any case, the specimens must be cooled down to room temperature and weighed. They are then placed in water, wholly covered, which is maintained at 77 degrees F. for 48 hours. At the end of this 48 hour period they are to be taken out of their bath, wiped off with a cloth and again weighed.

Thus we have (as must be shown in the report of the tests), the weight of the specimen as received, the dry weight of each and the weight after the 48 hour immersion. From these we can calculate the percentage of moisture contained when the pieces were received and the percentage after the 48 hour immersion. In this way the amount of moisture carried, or absorbed, by the different kinds of materials may be directly compared. It is then possible to make an intelligent selection of the best material to be used for a service where there will be exposure to moisture or in dry situations where moisture will not be present to any great extent.

The final test covered in the standards is to determine the dielectric strength at commercial power frequencies. This sounds rather formidable but actually it is nothing more than measuring the number of volts it will take to break down the insulation resistance of the material. The frequency of an alternating current line is important because dielectric strength generally decreases as the frequency goes up. However in this country there are now only two commercial frequencies—25 cycles and 60 cycles. The latter is by far the predominating com-

mercial frequency of the public utility companies. Of course dielectric strength is important because it is a measure of its insulating quality and indicates whether a given material is suitable for a given type of service. Of course the thicker a material is the higher voltage it will resist but there are usually limitations to the thickness which it is practicable to use, or at least there may be such limits. The test specimens are discs 4 in. in diameter and  $\frac{1}{8}$  in. thick for hot-molded materials, and  $\frac{1}{4}$  in. thick for cold-molded materials. Voltage is applied by means of flat electrodes 1 in. in diameter exactly opposite each other at the center of the test piece. The voltage must be increased at the rate of 1000 volts per second, at room temperature, until the specimen is punctured. The number of volts necessary to puncture the piece constitute the measure of the dielectric strength of the material. Five pieces should be tested in this way in order to find out whether the material is uniform in this respect. Such tests on hot-molded materials are best made when they are immersed in oil, and on cold-molded materials in the air. Similar tests must be made at higher temperatures if the service conditions under which the material is to be used are higher than room temperatures; and as a rule it might be said that one series of tests be made at the actual temperature of the service conditions and another at a somewhat higher temperature in order to know what is likely to happen if it should go higher than anticipated. Five specimens must be tested for each temperature. In order to make sure that the specimens are thoroughly heated through and through they should be left in the heating oven at the desired temperature for at least 30 minutes and the test should be made in the oven. Care must be taken not to have any of the specimens in the oven so close to the source of heat that one part may be hotter than another.

The standards also specify in detail the electrical apparatus which must be used in making these tests. As this is a lengthy and highly technical description, and as such tests could hardly be made by any than an experienced electrical man who can get his information directly from the standards, it has been omitted here.

With some kinds of material the dielectric strength may be so high, or the surface such, that there will be flashing of the voltage around the outside of the test piece from one electrode, or electrical terminal, to another without a direct puncture through the body of the material. If this occurs the only thing to do is to immerse the specimens in an oil bath, which will stop the flash-over. Where such tests are made above room temperatures the bath and all are placed in the heating oven and the thermometer, or other temperature measuring instrument, is placed in this bath.

Another series of tests must be made on three pieces of each kind of material to determine its dielectric strength when exposed to the absorption of moisture. This is done as follows: The rim of the disc shaped test specimen is immersed in melted paraffin for a depth of 1 in. This is to prevent a flash-over around the edges. The specimens are then immersed in water for 24 hrs. at room temperature, after which they are taken out, wiped with a dry cloth to remove the water from the surface of the pieces and tested to find out what voltage is required to puncture them in this condition. With this information at hand it is easy to select the right material for a given set of conditions, whether cold or hot, moist or dry.

The report of such tests must include:

1. The thickness of each specimen in thousandths of an inch.
2. The puncture voltage.
3. The volts per thousandth of an inch of thickness (which affords a direct comparison between different materials even if their thickness varies a little).
4. How the material acts with respect to leakage across its surface.
5. The temperature at which the tests were made.

In making any of these tests enumerated in the foregoing paragraphs it may often be desirable to use one mold for making specimens of similar shape but of differing composition. Under these conditions variations in the dimensions are permissible of

5 per cent. either way for hot-molded compounds, and of 10 per cent. for cold-molded compounds. The measurements of the test specimens provided for in each test are sufficient provision for taking such slight variations into account.

## Operation of a Cellulose Acetate Plant

Eggert, in *Kunststoffe*, gives data concerning the creation and operation of a small installation capable of producing 2,000 to 3,000 square meters of Cellophane-type paper in an eight-hour day.

The preliminary production of cellulose xanthate may be accomplished in a disintegrator operating in a vacuum, in which 100 kg. of wood pulp and 600 kg. of sodium hydroxide and carbonate in solution are treated in a single operation. During two hours the temperature is gradually raised from 15 to 42°; then add the calculated quantity of carbon disulfide and alkali and agitate for three hours at 23° to transform alkali cellulose into xanthate. The whole operation, including the action of the alkali, the separation of the residuary liquors by filtration and the transformation into xanthate, requires about ten hours.

The formation of sheets is now accomplished on a continuous spreading machine. The only precaution to be observed is to allow the xanthate to ripen for sufficient time before transforming it into sheets and before the coagulation in an acid bath which transforms xanthate into viscose. In practice, the sheet passes through three consecutive baths of different composition. The first contains sodium chloride and a little ammonia; the second contains sodium chloride and sulfites while the third bath is a solution of pure sodium chloride. The baths will be contaminated by the decomposition products of the xanthate and arrangement must be made for the continuous filtration and regeneration of the baths.

Finally, the complete decomposition of the xanthate is terminated in a supplementary bath containing formic acid or another appropriate acid and the finished sheet is rolled. The product is bleached and dyed at intervals throughout the day.

## Hearth Furniture from Synthetic Materials

The use of synthetic resin materials for molding all kinds of articles has up to the present been confined to commodities of small and medium sizes, depending chiefly upon the range of pressure-plant molding manufacturers have at their disposal. For some years past manufacturers have been carrying out developments in plant to enable them to produce moldings of greater dimensions, and their latest achievement is the production of hearth furniture—molded throughout in synthetic resin materials. To those familiar with the beautiful range of colors obtainable from these materials this new development marks a new epoch in tastefulness of home decoration, and a range of colors is being developed to harmonize with practically any decorative scheme. Synthetic resin materials provide a permanent finish that preserves its pristine gloss indefinitely. It requires no cleaning and does not harbor dust. The furniture is being produced by painted methods of design that allow the utmost variation in types of hearth furniture to suit each individual taste. Though costing no more than any wood or metal curbs, these new specialties are infinitely superior in appearance, finish and good taste.

## This Month's Cover

"The Nineteenth Hole" scene from The Fashion Group Exhibition of Man-Made Textiles and Plastics at the RCA Building. The "home" bar is made of Formica and exhibited by the Formica Insulation Company. With it is shown a bar stool with a Fabrikoid covering by The Howell Company. Various drinking accessories are developed in Bakelite.

# Plastics in Pictures

Decidedly striking to the eye are these signs of Bakelite Laminated with chromium plated lettering, an ideal combination which is springing into rapid favor not only from the cost point of view, but also because they are unusually distinctive in appearance and compellingly interesting to the observer.

A splendid example of the art of plastic molding is this sturdy but graceful cap which Proctor and Gamble have chosen as a closure for their new soapless shampoo.

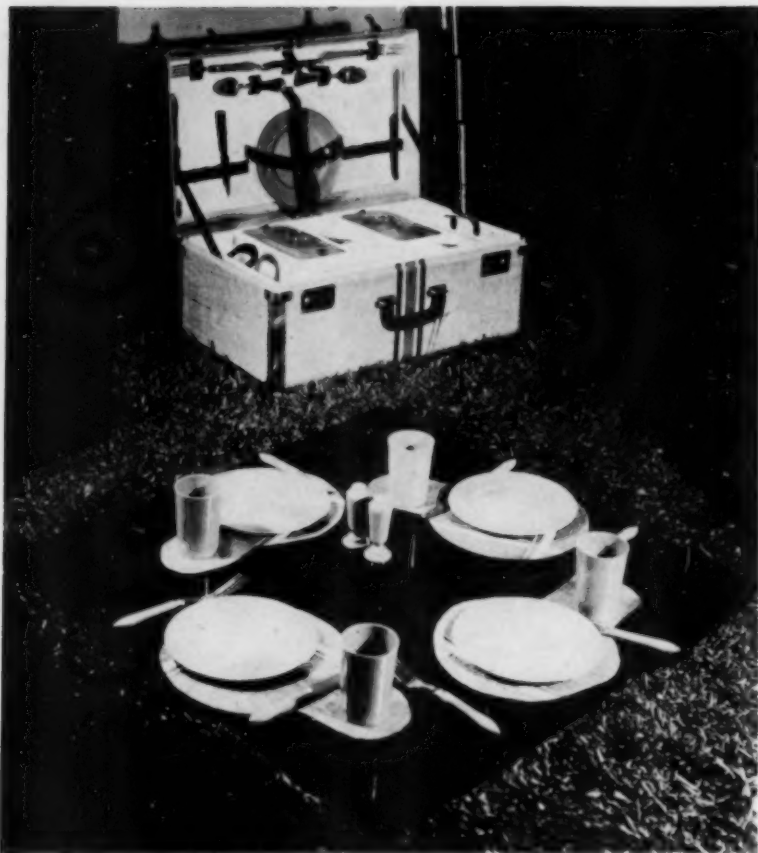


Courtesy, Drug and Cosmetic Industry

This stock jar, of plain but distinctive lines, is a new and definite development in plastics in that it may be had in stock in all popular sizes, and meets the most exacting requirements of cosmetic and other manufacturers. It is odorless, moisture-proof, non-warping, the material used having been developed through long contact with the cosmetic trade. Arrow-Hart & Hegemen Electric Company are offering these jars in lustrous jet black, radiant red, or red and black combinations.



Today milady need not fear the ill appearance which scuffed heels lend to shoes, for plastic covered heels, dispelling all scuffing qualities, are rapidly replacing the leather. DuPont Pyraheels do unusual work in matching the plastic coverings for heels with the texture of the other materials used for women's shoes, and some of our most expensive models boast these heels.



At Rockefeller Center, during April, the Fashion Group Exhibition of Man-Made Materials presented a wealth of new materials of plastic and synthetic origin, from a decorative as well as utilitarian point of view, which no one could afford to pass up. The "Al Fresco Dining" scene, a completely synthetic arrangement, included Bakelite plates, glasses and cutlery handles, Cellophane place-dojilies, and a Fabrikoid-covered hamper; the whole being an open bid for more and better outdoor picnics.



The "Dining for Two" scene—and a delightfully inviting one indeed—provided an extremely modernistic background. Featured were a smart square table with a Bakelite top, and dinner service of the same material in a sheer version. The chairs are covered with Fabrikoid upholstery; overdrapes are of acetate taffeta, and the glass curtains, Cellophane.

On the dressing tables on the opposite page rest Pyralin toileware sets of Cloisonne Lucile, a reproduction of luxuriant French enamel, and a handsome accessory to any dressing table. The pattern which has been wrought out in minute detail is available in maize, pink, rose and turquoise, with a lighter border of the same color and white edging. An important feature is that it does not break or chip, made possible by the Du Pont patented process of built-in decoration.

The city of Newark, which boasts the distinction of having been the home of the first plastic material, is having its own exhibit, "Miracles of Chemistry," at the Newark Museum. Here one learns how the chemist through his test tube is constantly bringing forth new synthetic products which are rapidly supplanting the old familiar materials, chief among these being plastics. This handsomely furnished living room, designed and decorated by Paul T. Frankl, is chemically created, man-made materials being used throughout the decorative scheme. The table and built-in desk are of Formica.





*Hidden away in a corner was the "Beauty Is As Beauty Has" boudoir scene, which showed the clever utilization of Du Pont knitted Cellophane for dressing table skirt and sheer glass curtains. Rayon moire was used as the covering for the stool and chair. Executed in delicate maize coloring these decorations were fair to behold and sent the visitor away filled with many new ideas for novel applications of these materials.*



Courtesy, Newark Museum



*A smart deviation from the ordinary chintz with which we have been wont to decorate our dressing tables is this Cellophane cover which has the appearance of luminous organdy, and drapes in a most enchanting manner. In this "Preliminaries" scene the toilet-ries shown feature plastic perfume bottle caps, rayon satin powder box tops, and molded plastic jars, with a Cloisonne toilet-set to complete the ensemble; while the shelves on the side accommodate undergarments made of rayon, acetate and cuprammonium yarns.*





# BUTANOL\*

## C.S.C.

*A Valuable Blending Agent*

The unusual ability of Butanol to blend otherwise incompatible materials, makes it exceptionally useful in many processes and products. Many liquids which in themselves are not miscible, are easily rendered so by the addition of a small proportion of Butanol. Solutions of organic substances, such as resins and gums, which cannot be mixed together without precipitation of one of the dissolved ingredients, are brought into perfectly homogeneous solution with the aid of Butanol. Combinations of insoluble materials, such as pigments, which tend to stratify, or "layer-out" when suspended in liquid vehicles, can be successfully blended together and held in homogeneous suspension by the addition of a small amount of Butanol.

In addition, Butanol serves industry as a solvent, detergent, defrother, penetrant, viscosity reducer, and as a basic material for the synthesis of many useful organic compounds. It finds use as a solvent for alkalis, camphor, capsicum, resins, resorcinol, gums, waxes, oils, etc., and is used in the manufacture of a wide variety of articles, such as rayon, artificial leather, cleaning solutions, collodion, drugs, motion picture films, polishes, varnish removers, lacquers, and chemicals.

### PROPERTIES

COLOR: Water White  
BOILING RANGE: 115° C. to 118° C.  
FLASH POINT: 35° C.  
MELTING POINT: Approximately -89° C.  
NON-VOLATILE MATTER: Not more than 0.005% by weight  
ACIDITY (as acetic): Less than 0.03%  
SOLUBILITY IN WATER: 8.90% by volume at 25° C.  
SOLUBILITY OF WATER IN BUTANOL: 17.12% by volume at 25° C.  
WEIGHT PER U. S. GALLON: 6.76 lbs. at 68° F.

### PRODUCTS

ACETONE • BUTANOL\* • BUTYL LACTATE  
BUTYL STEARATE • BUTYL ACETATE  
DIACETONE • BUTYL ACETYL RICINOLEATE  
BUTALYDE\* • DIBUTYL PHTHALATE  
ETHYL ALCOHOL • ETHYL ACETATE  
METHANOL • METHYLAMINES

\*Trade Mark Registered

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CHEMICALS FROM CORN

Continuation of "Series on Solvents and Plasticizers" from April issue

Names	Formulas Empirical Structural	Mol Wt	Sp. Gr.	D. Dil- uent	S. Solvent SS. Solvent Softener		NSS. Nonsolvent Softener P. Plasticizer		S. Solidifies or Melts F. Flash Point		L. Latent Heat of Fusion S. Specific Heat		Critical T. Temp. P. Pressure	Viscosity Centi- poises	V. Latent Heat of Vaporiz- ation	Capil- lary Const- ant	Refract- ive Index	Surface Tension
iso Butyl Aceto- acetate	$C_8H_{16}O_3$ $CH_3COCH_2COO$ $CH_2CH(CH_3)_2$	158	0.932 <sup>20</sup> 0.937 <sup>18.8</sup>	S					B 202.8						V 72.46 <sup>3</sup>		1.41828 <sup>18.8</sup>	
Butyl Adipate	$C_{14}H_{26}O_4$ $(CH_2)_4(COOCH_2CH_2)_2$	258		SS														
n Butanol	$C_4H_{10}O$ $CH_3(CH_2)_3OH$	74	0.8094 <sup>20</sup> 0.8099 <sup>20</sup>	LS	S -89.8 <sup>T</sup> F 35.35 <sup>T</sup> B 117.7 <sup>T</sup>	5.21 <sup>T</sup> 4.39 <sup>T</sup> 120							T 287 <sup>5</sup> P 48.40mm	2.46/25 <sup>T</sup>	S. 689 <sup>5</sup> V 141.2 <sup>5</sup>		1.3993 <sup>T</sup> 1.39909 <sup>20</sup>	24.6/20 <sup>3</sup>
Butanol 2 (secondary)	$C_4H_{10}O$ $CH_3CHOHCH_2CH_3$	74	0.808 <sup>20/20</sup>	LS	S								T 265				1.396 <sup>T</sup>	
iso Butyl Alcohol	$C_4H_{10}O$ $(CH_3)_2CHCH_2OH$	74	0.802 <sup>T</sup> 0.8046 <sup>17.5</sup>	LS	S -108 <sup>T</sup> F 27.5 <sup>T</sup> B 107.3 <sup>T</sup>	99.1/80 <sup>T</sup>							T 265 <sup>T</sup> P 48	3.37/25 <sup>T</sup>	S. 61 <sup>T</sup> V 138.4 <sup>3</sup>		1.3968 <sup>17.5</sup>	
Butyl Alcohol (tertiary)	$C_4H_{10}O$ $(CH_3)_3COH$	74	0.781 <sup>T</sup> 0.7864 <sup>20</sup>	LS	S 25.5 <sup>T</sup> F 83 <sup>T</sup> B 83 <sup>T</sup>	31.75 <sup>T</sup> 20							T 235 <sup>T</sup>	5.887/22.4 <sup>T</sup>			1.38779 <sup>20</sup>	20.44 <sup>10</sup>
n Butyl Aldehyde	$C_4H_8O$ $CH_3(CH_2)_3CHO$	72	0.8170 <sup>T</sup>	D	S -99 <sup>T</sup> F 18 <sup>T</sup> B 78.7 <sup>T</sup>												1.38433 <sup>20</sup>	
iso Butyl Aldehyde	$C_4H_8O$ $(CH_3)_2CHCHO$	72	0.794 <sup>T</sup> 0.7935 <sup>T</sup>	D	S -65.9 <sup>T</sup> F 61 <sup>T</sup>												1.37302 <sup>20</sup>	
n Butyl Amine	$C_4H_{11}N$ $CH_3(CH_2)_3NH_2$	73	0.740 <sup>T</sup>		S -50.5 <sup>T</sup> B 76 <sup>T</sup>									0.681/25 <sup>T</sup>			1.401 <sup>T</sup>	9.7/41 <sup>T</sup>
di-n-Butyl Amine	$C_8H_{19}N$ $[CH_3(CH_2)_3]_2NH$	129	0.767 <sup>3</sup> 20/20															41.1/20 <sup>T</sup>
Tri-Butyl Amine	$C_{12}H_{27}N$ $[CH_3(CH_2)_3]_3N$	185	0.778 <sup>T</sup> 20/20															
n-d. Butyl Aniline	$C_{14}H_{23}N$ $[CH_3(CH_2)_3]_2NCH_2$	205	0.907 <sup>T</sup> 20/20	NSS														
Di-iso Butyl Aniline	$C_{14}H_{23}N$ $C_6H_5N[CH_2CH(CH_3)]_2$	205	0.909 <sup>T</sup> 20	NSS														32.8/ <sup>T</sup> 28.9/42.5
iso Butyl Benzoate	$C_{11}H_{14}O_2$ $CH_3COOCH_2CH$ $(CH_3)_2$	178	1.002 <sup>T</sup> 17/15	SS													1.4930 <sup>10</sup>	
n Butyl Benzoate	$C_{11}H_{14}O_2$ $C_6H_5COOCH_2CH_2$ $CH_3$	178	1.000 <sup>T</sup> 20/20	SS	S -22.4 <sup>T</sup> B 250.3 <sup>T</sup>													
iso Butyl Butyrate	$C_8H_{16}O_2$ $CH_3(CH_2)_2COOCH_2$ $CH(CH_3)_2$	144	0.866 <sup>T</sup> 16/16	S		113/20 <sup>T</sup>							T 338	0.84/25 <sup>T</sup>	S. 458/20 <sup>T</sup> V 64.57 <sup>3</sup>		1.4035 <sup>T</sup>	12.0/187 <sup>T</sup>
n Butyl Butyrate	$C_8H_{16}O_2$ $CH_3(CH_2)_2COO$ $(CH_2)_2CH_3$	144	0.871 <sup>T</sup> 20/20	S											S. 458/20 <sup>T</sup>		1.4042 <sup>T</sup>	
Butyl Butyrate (secondary)	$C_8H_{16}O_2$ $CH_3(CH_2)_2COOCH$ $CH_2CH_2CH_3$	144		S														
n Butyl Caproate	$C_{10}H_{20}O_2$ $CH_3(CH_2)_4COOCH_2$ $(CH_3)_2CH_3$	172	0.8824 <sup>T</sup> 20	S														
Butyl Caproate (secondary)	$C_{10}H_{20}O_2$ $CH_3(CH_2)_4COOCH$ $CH_2CH_2CH_3$	172	0.8635 <sup>T</sup>	S														
n Butyl Carbonate	$C_9H_{18}O_3$ $CO[OCH_2CH_2CH_2]_2$	174	0.924 <sup>T</sup>	S													1.412 <sup>T</sup>	
iso Butyl Carbonate	$C_9H_{18}O_3$ $CO[OCH_2CH(CH_3)]_2$	174	0.919 <sup>T</sup> 15/15	S													1.407 <sup>T</sup>	
Butyl Chloracetate	$C_6H_{11}O_2Cl$ $CH_2ClCOOCH_2$ $(CH_3)_2CH_3$	150	0.881 <sup>T</sup> 15	S														
iso-Butyl Chloracetate	$C_6H_{11}O_2Cl$ $CH_2ClCOOCH_2CH$ $(CH_3)_2$	150	1.0675 <sup>T</sup> 1174	S														

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Names	Formulas Empirical Structural	Mol Wt	Sp. Gr.	D-Dil- uent	S-Solvent SS-Solvent Softener P-Plasticizer	B-Bail- ing Point	Vapour Pres- sure	Critical T-Temp. P-Pressure	Viscosity Centi- poises	L-Latent Heat of Fusion S-Specific Heat	Capil- lary Const- ant	Refract- ive Index	Surface Tension
n Butyl Stearate	$C_{22}H_{44}O_2$ $CH_3(CH_2)_6COO(CH_2)_3CH_3$	340	0.856 <sup>25/15</sup>	NSS	S 19.5	322.5/25						1.4468	
Di-n-Butyl Sulfone	$C_{16}H_{34}O_2S$ $[CH_3(CH_2)_3]_2SO_2$	178		P	S 43.5								
Di-Butyl Tartrate	$C_{18}H_{34}O_6$ $(CHON)_2[COO(CH_2)_3CH_3]_2$	262	1.0925 <sup>15</sup>	SS	S 22. F 160 320.3/15								
n Butyric Acid	$C_4H_8O_2$ $CH_3(CH_2)_2COOH$	88	0.959	D	S -7.9 163.5	0.75/20 1.5/30	T 355	1.599/20	L 30.1 S 54/20-100 V 113.96			1.3979 1.3977 20.3	
α-mono Butyrin	$C_{11}H_{20}O_4$ $CH_3(CH_2)_2COOCH_2CHONCH_2OH$	162	1.0324 <sup>25</sup>	D	S -60 271	24/133						1.4857 <sup>25</sup>	
β-di-Butyrin	$C_{11}H_{20}O_5$ $[CH_3(CH_2)_2COO]_2CH_2CHONCH_2OH$	232		D									
γ-di-Butyrin	$C_{11}H_{20}O_5$ $[CH_3(CH_2)_2COO]_2CH_2CHONCH_2OH$	232		D									
Tri-Butyrin	$C_{15}H_{26}O_6$ $[CH_3(CH_2)_2COO]_3CH_2CHONCH_2OH$	302	1.027	D	S -75 310							1.4357	33.0/-20 25.5/100
d-Camphor	$C_{10}H_{16}O$ $(CH_3)_2CCCH_2CH_2COCH_2CHCH_3$	152	0.990 <sup>25</sup>	P LS	S 179 209	380/80							
dl-Camphor	$C_{10}H_{16}O$ $(CH_3)_2CCCH_2COCH_2CHCH_3$	152		P LS	M 174								
Carbon-bisulfide	$CS_2$	76	1.261 <sup>25</sup> 1.273 1.265/18	D	S -111.6 F -25.5 B 463	127/0 89.5/20 114.5/25	T 273 P 70	0.35/20	S 34 V 84			1.6315 1.6295 18	33.5/20
Carbon tetrachloride	$CCl_4$	154	1.5947 <sup>25</sup> 1.0695 12.3	D	S -23.0 76.8	89.5/20 114.5/25	T 283.1 P 45	0.88/25	L 4.16 S 2.5 V 46.4			1.4607 1.4656 12.3	1936/77
p-Chloracetanilid (para)	$C_8H_9ONCl$ $C_6H_4CINHCOCH_3$	169	1.385 <sup>20</sup>	P	S 172.5								
Chloroacetic Acid	$C_2H_3O_2Cl$ $CH_2ClCOOH$	94	1.370 <sup>20</sup> 1.53 20	S	S 61.2 189					L 31.1		33.3/20	
Di-Chloroacetic Acid	$C_2H_2O_2Cl_2$ $CHCl_2COOH$	129	1.563 <sup>25</sup>	S	S -4 193.5					L 44.2 S 35/21-196 V 77/194		1.4659	35.4/25.7
Chloroacetyl chloride	$C_2H_2OCl_2$	113	1.495 <sup>20</sup>	S									
Chloral Trichloroacetaldehyde	$C_2HOC1_3$ $CCl_3CHO$	147	1.5121 <sup>20</sup>	D	S -57.5 98.1			101/40	S 250/17-33 V 524/			1.45572 20	30.0/20
mono Chlor benzol	$C_6H_5Cl$	113	1.107 <sup>25</sup> 1.1066	D	S -45.2 F 29 B 132.1	9/20 8.76/20	T 359 P 44.6	1.03/0	S 33 V 74			1.525 1.52479	33.9/20
o-Di Chlor benzol	$C_6H_4Cl_2$	147	1.298 <sup>25</sup> 1.2979 20.4	D	S -14 F 77 B 179							1.549 1.54808 20.4	
odi-Chlor benzol (commercial)	$C_6H_4Cl_2$	147	1.308 <sup>25</sup>	D	S -17.6 179					L 21 S .71 V 64.4		1.549	
m-Di-Chlor benzol	$C_6H_4Cl_2$	147	1.288 <sup>25</sup> 1.2879 20.9	D	S -24.8 172					L 20.6		1.546 1.54570 20.9	28.6/30 41.6/-22
p-Di-Chlor benzol	$C_6H_4Cl_2$	147	1.458 <sup>25</sup> 1.2189 80.3	D	S 52.9 F 67 B 173.7					L 29.6		1.5266 69.9 1.52106 80.3	30.72/68
o-Chlorbenzyl Alco- hol	$C_7H_7OCl$ $C_6H_4ClCH_2OH$	143		S	S 72 B 230								
m-Chlorbenzyl Alcohol	$C_7H_7OCl$	143		S	B 234								

To be continued in June

# Industrial Coatings

A department devoted to the manufacture and industrial applications of lacquers, varnishes, other finishes, coated and impregnated fabrics.

## Technology of Cellulose Derivatives

ALTHOUGH the cellulose esters and ethers are frequently described in literature, reference is often lacking to data on those properties a knowledge of which is essential for their satisfactory application. The following article, by K. Mienes and G. von Frank, in *Synthetic and Applied Finishes*,\* gives the results of a systematic study of the properties of cellulose esters and ethers which are of technical importance.

The present prices of cellulose derivatives, which increase in the order: nitro-cellulose, acetyl-cellulose, ethyl-cellulose, benzyl-cellulose, correspond only in part to the actual cost on the basis of chemicals consumed in their manufacture. The costs incidental to the necessary plant and the regeneration of the excess of esterifying or etherifying liquids are decisive factors. The advantageous position of nitro-cellulose is attributable to the possibility of effecting the conversion while maintaining the fibre structure, but ethyl-cellulose is also less costly than acetyl-cellulose in the sense that the finishing process after etherification is considerably simpler. Further, it is of great significance that by regulating the degree of esterification or etherification of the individual cellulose derivatives their viscosity and stability can be controlled.

In assessing the technically important properties of cellulose esters and ethers, it is particularly desirable to take into account the possibilities of improving them by the addition of other components. The properties which may be thus altered include principally the combustibility, resistance to water and mechanical influences, and also to some extent the melting point and stability; on the other hand, chemical stability, transparency, and the behavior towards solvents of the kind employed in practice are for the most part unaltered.

The comparative figures given in Table I illustrate the general differences in physical and chemical behavior among various ordinary commercial cellulose derivatives; in this comparison, I represents the highest quality and the higher numbers indicate a depreciation of the property in comparison with the optimum.

\*Translation of a reprint from *Angewandte Chemie*.

Table I

Property	Cellulose Derivative			
	Acetyl-cellulose	Nitro-cellulose	Ethyl-cellulose	Benzyl-cellulose
Chemical resistance . . . . .	2	2	1	1
Transparency . . . . .	2	1	4	3
Combustibility . . . . .	1	3	2	2
Resistance to heat . . . . .	1	4	2	3
Resistance to light . . . . .	2	3	1	4
Tensile strength . . . . .	2	1	3	3
Resistance to water . . . . .	2	1	3	1
Elasticity . . . . .	2	1	3	4
Extensibility . . . . .	4	3	2	1
Solubility* . . . . .	4	2	1	3

\*Behavior towards solvents of various types.

It is evident that in respect to transparency and color characteristics the films of the esters are superior to those of the ethers, and, further, nitrocellulose occupies first position in this connection. Attempts to reduce the combustibility of nitro-cellulose films were successful only with pigmented Celluloid-like masses with which calcium sulfate was incorporated (Trolit process); with other cellulose derivatives which are only slightly combustible the presence of pigments and metallic powders causes a surprisingly great increase in the combustibility. The resistance of cellulose derivatives towards heat degradation, which is generally described as stability, is not always identical with the resistance in practice to service conditions (ageing), since in the latter case the destructive action of short-wave light rays has to be considered in conjunction with atmospheric influences. As regards stability towards light, ethyl- and acetyl-cellulose are superior to nitro- and benzyl-cellulose; the stability of these derivatives can, however, be considerably improved by suitable additions.

In assessing the stability towards water, it must be remembered that the permeability to liquid water is not always the same as the permeability to water vapor. A low degree of permeability to moisture is particularly necessary in lacquer coatings and plastic masses used for electrical insulation, and also in the foil industry (packing material). Nitrocellulose and benzyl-cellulose are specially suitable for the manufacture of waterproof products, since not only are they hydrophobic of themselves, but also they can be readily combined with materials which are able to exert a favorable effect on the waterproof qualities; they are thus particularly applicable to the production of moisture-resistant coatings on cellulose hydrate foils.

The behavior of the cellulose derivatives toward solvents is of the greatest importance in connection with their utilization. Whereas the so-called two-type solvents, which contain several

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molecular groupings, have a fairly comprehensive solvent power for all cellulose derivatives, the single solvents exhibit characteristic differences. Thus only the cellulose ethers are soluble in hydrocarbons and halogenated hydrocarbons, while ethyl-cellulose and some nitro-cottons of low nitrogen content are soluble in the lower alcohols. The working up of cellulose derivatives is highly dependent also on the viscosity of their solutions. In the lacquer industry it is necessary for technical reasons to use solvents which give solutions of low viscosity; in the film and foil industries a high viscosity is necessary, whereas in the production of plastic masses the viscosity of the masses must not depart from a certain value which is determined by the efficiency of the apparatus available.

The mechanical requirements of products made from cellulose derivatives, such as lacquer films or foils, comprise on the one hand hardness and elasticity, and on the other hand resistance to tearing and crumpling; these properties are required in the highest degree for motion picture films. In respect of tear-resistance, nitrocellulose occupies the first place, followed by acetyl-cellulose, ethyl-and benzyl-cellulose; the extensibility is in the above order, but reversed. Plasticizers in general give rise to an increase in the extensibility, with a simultaneous diminution in strength. Cases in which the use of a plasticizer results in an increased total extension, as well as enhanced reversible expansion, are, unfortunately, very rare.

In the choice of a cellulose derivative for a particular purpose it is necessary to consider not only the appropriate properties of the final product but also the requirements of the working-up process. The conversion of cellulose derivatives into lacquers necessitates, for example, a careful choice of solvents and diluents.

Whereas low-boiling solvents and solvent mixtures for all cellulose derivatives are available in sufficient quantity, the solvents of medium boiling range do not contain any of those types, so essential for the "dispersion" of lacquers, which are stable, cheap, and physiologically inert solvents for acetyl-cellulose. With regard to the possibility of using cheaper blending agents, nitro-cellulose and the cellulose ethers show an advantage over the acetate. The application of the esters and ethers in the dipping, spraying, and molding processes is influenced to a great extent by these considerations. In the preparation of photographic films and foils the choice and composition of the solvent generally present no difficulty. As regards its power of combining with plasticizers and resins, nitro-cellulose is superior to the cellulose ethers and acetyl-cellulose; for plasticizing cellulose derivatives it is, in general, preferable to use mixtures of gelatinizing and non-gelatinizing plasticizers.

Besides the general directions in which cellulose esters are employed (see Table II), mention may be made of some special uses for cellulose ether lacquers. They are suitable for the preparation of matt lacquers, of alkali- and acid-resistant coatings, of heat-resistant lacquers for hot plates and electric lamp dipping lacquers, and also, by virtue of their good impregnating properties, for impregnating fabrics to render them waterproof.

For the manufacture of Celluloid-like plastic masses, the esters (nitro- and acetyl-cellulose) are the only cellulose derivatives which can be used, since they are distinguished by high transparency, strength, and elasticity. The difference in the manufacture of Celluloid and cello is that in the latter case, instead of an alcoholic solution of camphor a combination of a camphor substitute with a mixture of benzol and alcohol is used, and the process is carried out at a higher temperature. When a certain degree of turbidity or coloration is of little importance, as in pigmented masses for the production of molded articles, the cellulose ethers can be used. At the present time it is true that nitro-cellulose and acetyl-cellulose hold first position in this direction, owing to the fact that they can be used in the Trolit process, with consequent economy of solvent. There are good prospects for the use of cellulose ethers in the production of relatively heat-resistant molded articles, since the amount of plasticizer required to work them up into molding and spraying powders can be very largely reduced, or even dispensed with.

The appended table shows some of the most important uses of the more generally employed cellulose derivatives.

Table II

Use*	Cellulose Derivative			
	Acetyl-cellulose	Nitro-cellulose	Ethyl-cellulose	Benzyl-cellulose
Lacquers for:				
Insulation.....	+	—	+ —	+
Automobiles.....	—	+	—	—
Wood.....	+ —	+	—	+ —
Metals.....	—	+	+ —	—
Airplanes.....	+	+	—	—
Plastic Masses:				
Celluloid-like masses....	+	+	—	—
Moldings.....	+	+ —	—	+ —
Endless Bands:				
Foils.....	+	—	+ —	+ —
Photographic films.....	+	+	—	—

Note. + indicates useful; — not useful; + — of little use or useful only in few circumstances.

A single cellulose derivative is thus not able to serve for every possible type of application.

\*The important application for artificial silk has not been dealt with in the present work, since for this industry acetyl-cellulose is used exclusively.

## Color and Design for Containers

By A. R. Carnie  
Continental Can Company

A well designed can must shout in a crowd, where it needs to attract attention, but should speak softly in the boudoir.

Good, old-fashioned red is still the best attention-getter although only a tiny spot may be needed. Black is the most legible color for printing. Curiously, one of the most effective combinations really uses no colors at all. It consists of black, gray and white, which are not true colors.

The old advice, "don't change your package" is often wrong. Redesigning an ugly or ineffective package will always increase its salability, no matter how well-established or familiar to the customer the old one may be. Care must be taken to tie the old design to the new one by retaining some distinctive feature of it in the new package. It may be a trade-mark, a signature, a distinctive shape or some other characteristic, but if properly worked in, it will hold the old customer and add new ones.

An artist untrained in can designing, no matter how much he may be talented otherwise, would be quite at sea in this specialized field. In fact, it is so highly specialized that often no one artist makes a complete design and the company has a roster of thirty or forty experts on whom it can call. Lettering, for instance, is done by specialists in this work alone, and the artist who develops a design may not be the one who colors it.

To add to the difficulties, the reproduction "layouts" must be drawn accurately to one-one-thousandth of an inch in a maze of limit lines and registry marks. And, since selling is the foundation on which the designer must build, the conditions under which the can will be displayed must be a paramount consideration. Oil cans will be stacked on the filling station island, below eye level. Grocery cans will be on shelves above eye level. Cans used in window displays may be shown by a theatrical sort of artificial lighting. The can whose contents are used slowly may need a substantial amount of printed text, while the motor-oil can must blare its identity to catch the instant glance of the passing motorist.

Of the characteristics of a can, roundness is the most important. By the artful use of color and design, squatty cans can be made to look tall and tall cans may be shortened, but a circle on a round can will always look oval, with the added complication that such a thing as a contrasting band below or above will pull the "oval" into an egg-shape. The design must counteract these illusions.

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# Plastics and Coating News

## Large Crowds Attracted to Current Expositions—Premium Exhibit Opens May 7—G. E. Enters Suit Against Paramet, Alleging Violation Kienle Patent—Warren Now With Makalot—Maxwell Opens Consulting Office.

Displaying 25 scenes from contemporary life ranging from a spectacular opera box to "kitchen technique," and from "gym for figures" to "heavenly spins" in aviation clothes, The Fashion Group opened its Exhibition of Fashions and House Furnishings in "Man Made" Materials Mar. 28 with a private Pre-View Reception for 600 guests. Exhibition was held in the Fashion Group's own gallery on the 7th floor of the RCA Bldg., 30 Rockefeller Plaza, N. Y. City. It was open to the public for a month from 10 o'clock in the morning to six at night daily and from 8 to 10 o'clock Tuesday and Thursday nights. There was no fee.

Eleanor LeMaire, distinguished interior architect, designed the exhibition which drew nation-wide attention. Alice Sharkey, widely known in decorative and industrial arts, is director. Marion C. Taylor is chairman of The Fashion Group's exhibition committee and Emma Lou Fetta, chairman of its press committee.

Exhibition was designed to show in a dramatic and modern manner the basic fiber and plastic materials of the age which have become of paramount importance in fashion and decorative fields as a result of man-kind's long laboratory search of media for new utility and beauty. All the multitude of clothes, jewels and other accessories and furnishings exhibited are made of rayons, acetates and cuprammonium and revolite textiles; cellulose sheeted materials; molded, cast and laminated materials, and other plastic developments of the age.

Departing from the stereotype exhibition plan of formal booths, The Fashion Group spotted its exhibitors throughout 25 gay and spectacular little scenes each of which illustrated clothes to wear and the surroundings of various occasions, activities of modern life-in town. There were scenes in kitchen, boudoir, shower, drawing room, and country, on land, sea and in the air, at the theater, the opera, the races, bridge parties, cocktail parties, daylight and formal dining, in gymnasiums, at dude ranches and country and beach clubs, and on shopping trips, on train, in automobile, at desert resorts, and picnics in the up-to-date manner.

Somewhat higher in the same building (the 62nd floor to be exact) another exhibition, Industrial Arts Exposition of the National Alliance of Art and Industry, attracted large crowds during the entire month of April. The modern motif predominated almost exclusively in the thousands of articles displayed. Plastic materials were well represented. Among the booth exhibitors were Toledo Synthetic Products, Tennessee Eastman, Catalin, General Plastics, and others. Managements report that attendance records far surpassed even their most optimistic estimates, indicating on the part of the public a renewed and invigorated interest in new materials which has awakened from a 3-year slumber with the coming of recovery.

Over in Newark, N. J., large crowds were attracted in the past month to the Newark Museum where a splendid exhibit vividly portrayed chemical industry's importance to the State of New Jersey. Again plastics materials were well represented. This ex-

position will remain open through May at least. For numerous pictures see the Roto Section, this issue.

### 4th Premium Exposition

Beetleware, Bakelite, and Hemeo Molding Division, Bryant Electric, are among the 100 exhibitors signed for the Fourth Annual National Premium Exposition to be held at the Palmer House in Chicago, May 7-11.

### G. E. Sues Paramet

General Electric, producer of Glyptal resins, has entered suit against Paramet Chemical, alleging infringement of patent No. 1,893,873, issued in January, '33 to Roy H. Kienle and assigned to G. E. Latter seeks an injunction against further manufacture and sale under this patent, and asks damages. Charles H. Neave, who represented du Pont in the Flaherty lacquer patent suits, is representing G. E., and Gifford, Scull and Burgess is representing Paramet.

Paramet manufactures a number of materials, such as Paramet ester gum, Paranol and Dura resins, all of which are not included in the present litigation. The action is limited to the Kienle patent and refers to the sale of Paramet's Esterol, grades A, B, C and D.

## February Paint, Varnish and Lacquer Sales

Statistics on sales of paint, varnish, and lacquer products, based on data reported to the Bureau of the Census by 586 identical establishments, are presented in the table below, which shows, by months, total volume of sales reported, volume reported by 242 establishments which are unable to classify their sales into trade and industrial, and the volume reported by 344 establishments which have classified their sales into trade and industrial (paint and varnish, and lacquer).

Year and Month	Total sales reported by 586 establishments	Classified sales reported by 344 establishments—			Unclassified sales reported by 242 establishments	
		Total	Industrial sales Paint and varnish	Trade sales of paint, varnish and Lacquer		
1934						
January.	\$20,643,659	\$6,015,030	\$4,290,923	\$1,724,107	\$7,470,517	\$7,158,112
Feb.....	17,715,447	5,639,413	3,714,128	1,925,285	6,256,162	5,819,872
1933						
Jan.....	\$11,275,396	\$3,529,886	\$2,386,947	\$1,142,939	\$4,168,260	\$3,577,250
Feb.....	11,665,734	3,423,033	2,445,378	977,655	4,771,706	3,470,995
March....	13,578,568	3,391,947	2,484,580	907,397	5,788,213	4,398,408
April....	19,043,787	4,677,309	3,143,803	1,533,506	8,582,411	5,784,067
May.....	26,241,044	5,991,938	4,298,485	1,693,453	11,788,573	8,460,533
June.....	27,813,233	6,827,509	4,832,551	1,994,958	12,443,998	8,541,726
July.....	22,090,187	6,406,184	4,493,516	1,912,668	8,627,400	7,056,603
August....	20,620,811	6,323,475	4,754,701	1,568,774	7,840,359	6,456,977
Sept.....	19,097,803	5,544,686	3,978,917	1,565,769	7,462,113	6,091,004
Oct.....	18,944,106	4,949,755	3,721,420	1,228,335	7,376,012	6,618,339
Nov.....	16,234,234	4,656,353	3,466,174	1,190,179	6,566,187	5,011,724
Dec.....	16,156,062	4,418,023	4,428,376	989,647	6,157,567	5,580,472
Total (Year)	\$222,760,965	\$60,140,098	\$43,431,788	\$16,708,310	\$91,572,769	\$71,048,098
1932						
Jan.....	15,894,506					
Feb.....	16,270,822					
March....	19,089,005	(a)	(a)	(a)	(a)	(a)
April....	22,612,193					
May.....	24,981,441					
June.....	19,637,358	4,685,399	3,617,719	1,067,680	8,734,330	6,217,629
July.....	14,430,122	3,793,245	2,900,707	892,538	6,058,813	4,578,064
Aug.....	16,032,441	3,851,028	3,057,096	793,932	6,918,659	5,262,764
Sept.....	16,805,712	3,980,564	3,113,303	867,261	7,216,745	5,608,400
Oct.....	15,592,377	3,996,500	3,036,323	960,177	6,610,011	4,985,866
Nov.....	12,492,818	3,599,319	2,639,562	959,957	5,196,766	3,696,733
Dec.....	9,484,520	3,222,770	2,186,706	1,036,064	3,506,715	2,765,035
Total (Year)	\$203,323,315					
(a) Comparable statistics not available.						

(a) Comparable statistics not available.



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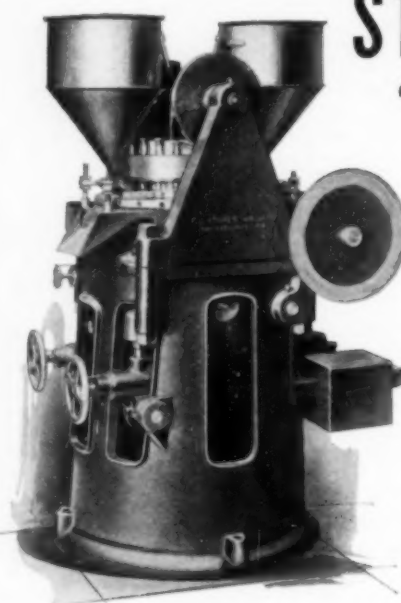
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## Coatings

Durez oil soluble resin agents for Cleveland and northern Ohio are: J. C. Drouillard Co.; in Chicago, Edward J. Lewis; the Pacific Coast, L. J. Butcher Co.; Detroit, Edward C. Stark.

### New Leather Coating

Horace H. Hopkins, Ridley Park, Pa., has been granted U. S. patent 1,954,750, holding 7 claims connected with manufacture of patent leather. Patent covers "a process of manufacturing patent leather which comprises subjecting leather to treatment with a composition comprised of japaner's oil, applying over the coating or coatings applied in such a treatment, a coating comprising a drying oil, modified polyhydric alcohol-polybasic acid resin and baking to harden the resin coating."

### Paint Board Meets

Paint Industry Recovery Board under Chairman Trigg and National Industrial Sales Committee held a 3-day meeting Apr. 11-13 in Chicago. Board voted to incorporate Code Authority and appointed M. Q. MacDonald, N.P.V. & L.A. counsel, as general counsel.

### Beck, Koller Convention

Beck, Koller's sales representatives were welcomed in Detroit, Apr. 13 by President Reichhold (just back from a 3-weeks European round trip) and later heard Technical Director, Dr. Wilhelm Krumbhaar. Marshall Dill, San Francisco, also spoke.

### German Paint Authority

I. G.'s paint and varnish expert, Dr. Otto Jordan, is in this country visiting with Vice-President Mullaly, Advance Solvents. Dr. Jordan edited "The Chemical Technology of the Solvents."

## Obituaries

### Alton Farrel

Alton Farrel, 54, former treasurer of Farrel-Birmingham Co., Ansonia, Conn., died in New Haven, Mar. 28 after a year's illness. He was treasurer for about 20 years of the Ansonia company, which was founded by his uncle, Franklin Farrel. Born in Ansonia, he was graduated from St. Paul's School and from Yale. He had been Mayor of Ansonia, a member of the military staff of Governors Chamberlain and Holcomb, and State Senator from the 17th district, which includes Ansonia. He had been a member of many clubs and fraternal organizations.

Surviving are his widow, 3 children Alton, Jr., Robert and Jean; a sister, Mrs. B. Austin Cheney, and an aunt, Mrs. Rutherford Trowbridge, all of New Haven.

### Walter Wood

Walter Wood, 84, president, R. D. Wood & Co., large manufacturers of hydraulic presses and other equipment used in the plastics field, died April 20 in Washington.

### Consultants Move

George Barsky and Ernest D. Wilson, consulting chemists and chemical engineers, have moved from 521 5th ave. to more extensive office and laboratory space at 202 E. 44th st., N. Y. City. Telephone is the same, Murray Hill 2-3689.

### G. E. Notes

Sales billed by G. E. for 1st quarter of '34 amounted to \$34,936,000, which compared with \$26,101,000 for the same quarter a year ago, showed an increase of 35%. President Gerard Swope announced to stockholders April 17. Profit available for dividends for quarter was \$4,566,000, compared with \$2,839,000, an increase of 61%. After payment of dividends on special stock, profit available for dividends on common for 1st quarter amounted to \$3,922,000, compared with \$2,195,000 for same period in '33. This, Mr. Swope pointed out, is equivalent to 14c per share for the quarter, as compared with 8c per share for the 1st quarter in '33, 14c for the last quarter in '33, and 16c per share for the 1st quarter in '32. Orders received during this 1st quarter of '34 amounted to \$38,149,000, compared with \$25,512,000 for the same quarter in '33, or an increase of 50%.

A 10% pay increase to G. E. employees receiving \$2,600 or under, either on salary or hourly rate, effective Apr. 1, was announced Mar. 30. Increase affects

between 38,000 and 40,000 and increases payroll \$3,500,000 to \$4,000,000 per year.

Work was begun last week in March on exhibits planned for the '34 world's fair by G. E.

## Cellulose

Following table presents monthly statistics relating to pyroxylin-coated textiles based on data reported to the Bureau of the Census by manufacturers comprising most of the industry. The data include products manufactured by spreading nitro-cellulose or pyroxylin preparations, either by themselves or in combination with other materials, upon grey goods, such as sheetings, drills, ducks, sateens, moleskins, etc.

NUMBER OF MFGRS. REPORTING.....	1934	
	February	January
LIGHT GOODS:	20	20
Shipments—		
Linear yards.....	2,221,604	1,477,513
Value.....	\$636,454	\$377,531
Unfilled orders (a)—		
Linear yards.....	1,654,288	1,295,953
HEAVY GOODS:		
Shipments—		
Linear yards.....	1,589,901	1,398,253
Value.....	\$844,688	\$773,428
Unfilled orders (a)—		
Linear yards.....	2,555,676	2,087,217
PYROXYLIN SPREAD (b):		
Pounds.....	5,278,210	3,283,049
MONTHLY CAPACITY (c):		
Linear yards.....	12,822,689	12,822,689
(a) Orders on hand at the close of the current month (reported in yards only) exclusive of contracts with shipping dates unspecified.		
(b) Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly.		
(c) Based on a maximum quantity of 1.27 to 1.30 sateen, coated to a finished weight of 17½ ounces per linear yard, in a 24-hour working day, 26 days to a month.		
*Revised. Certain establishments discovered errors in capacity figures previously reported.		

### Celluloid Personnel

R. L. Simmons, formerly Celluloid's sales manager, has been appointed plant manager at the Newark plant. R. C. Cory is now sales manager and is being assisted by Patrick Davis, formerly of the Newark plant.

### Cellulose Plastic Products (Nitro Cellulose and Cellulose Acetate Sheets, Rods and Tubes) February, 1934

#### Compared with preceding months

The Bureau of the Census presents, in the following table, monthly statistics on production and shipments of cellulose plastic products (sheets, rods, and tubes) for February, 1934, based on data furnished by 10 identical manufacturers. Statistics are also shown for 8 identical manufacturers from January to July, and for 10 identical manufacturers from August to December, inclusive, 1933. Segregated data for nitro-cellulose and cellulose-acetate products, are not available prior to January, 1933. This report takes the place of the monthly report on "Pyroxylin Sheets, Rods, and Tubes."

#### Production and Shipments (Pounds)

Year & Mo.	Sheets		Rods		Tubes		Cellulose-Acetate Sheets, Rods, and Tubes	
	Production	Shipments	Production	Shipments	Production	Shipments	Production	Shipments
1934								
January.....	734,085	701,581	138,590	160,081	75,106	67,853	357,836	377,346
February....	916,646	849,552	159,936	133,585	75,315	62,473	435,690	418,027
1933								
January.....	504,813	625,392	74,872	115,434	12,812	29,329	167,856	160,272
February....	490,290	593,942	78,904	100,092	16,248	25,711	141,628	128,073
March.....	454,506	611,840	63,188	87,784	17,472	32,525	119,400	117,344
April.....	473,333	624,727	104,817	130,853	26,198	27,091	149,402	211,435
May.....	787,614	774,424	161,784	126,195	32,684	36,992	234,811	221,345
June.....	912,742	959,194	156,830	139,772	41,467	45,057	242,013	220,686
July.....	1,027,812	916,612	158,250	160,851	42,100	41,467	192,381	221,751
August.....	1,290,521	1,257,981	254,249	236,730	40,364	56,142	230,013	231,879
September...	1,307,052	1,158,080	241,558	232,725	49,263	58,962	213,996	229,629
October.....	1,056,328	991,557	254,375	216,191	76,291	69,258	207,327	217,892
November....	641,059	827,544	189,668	134,750	78,712	63,967	287,872	278,774
December....	562,152	944,821	163,317	183,471	72,428	92,673	325,412	362,362
Total (year)	9,508,222	10,286,114	1,901,812	1,864,848	506,030	579,174	2,482,111	2,588,442



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Oliver F. Benz, director of sales of Du Pont Cellophane discussed a "Quality Control Plan" at a meeting of the marketing and distribution council of the Advertising Club in N. Y. City on Apr. 23.

## Laminated

A typical example of the new trend in smart, colorful, distinctive bar rooms is illustrated by the Manhattan Room of the Hotel New Yorker. Character and personality are reflected in the decorative effects giving an air of charm to all the surroundings. Westinghouse Micarta, in which the bar and table tops are finished has contributed much to the effectiveness of the charming setting. The micarta is inlaid with richly colored anodic aluminum making an unusual and pleasing pattern with the ability to resist wear and hard usage.

## Molded

J. L. Oris, formerly of Plastic Molding, Sandy Hook, Conn., and G. E. Atwood of Litchfield, Conn., have formed Atwood and Oris Mfg. Co. at Thomaston, Conn. Company is well-equipped for custom molding and manufacture of electrical insulation parts and plant is now in full operation.

### Warren With Makalot

Richard F. Warren, for the past 2½ years Bryant Electric's chief chemist and factory manager, is now in charge of Makalot's Waltham, Mass., plant. A Ch.E. out of Rensselaer in '16 he 1st went with the war-baby, Butterworth-Judson, in the Jersey meadows in dye research, later becoming shift "super" for the entire plant. During the war he erected a picric acid plant at South Bend for the Government. Later he was chief chemist for Eagle Printing Ink. He spent 12 years as Columbia Phonograph's chief chemist and

his wide experience in resins and molding compounds eminently fits him for his present Makalot position.

### Maxwell Now Consultant

D. Gray Maxwell, formerly in charge of Tech Art, Boonton, N. J., has formed Plastic Engineering, 369 Lexington ave., N. Y. City, a design, engineering and estimating service on plastics with direct factory connections.

### Now Recto Molded Products

N. A. Backscheider has purchased plant of Recto Mfg., Cincinnati, at auction. Business will continue under the name of Recto Molded Products, Inc.

### New Designing Service

Donald R. Dohner, former Westinghouse Director of Art (Engineering Dept.) and Alexander J. Kostellow, Professor of Industrial Design, Carnegie "Tech", have established offices at 99 Vandergrift Bldg., Pittsburgh, where they will carry on an Industrial Design and Research Service. Mr. Dohner is widely known for his work in industrial design and was recently chosen by *Fortune* as one of the 10 leading American designers. Mr. Kostellow was educated in Berlin, Paris and N. Y. City and is recipient of national and international honors in the field of painting. At present, in addition to his work at Carnegie, he is industrial design consultant for several industrial concerns. Dohner and Kostellow will conduct a complete design and sales research service.

Philadelphia Rust-Proof, 1727 N. Howard st., Philadelphia, has mailed out an interesting leaflet "Improve Your Product By Chromium Plating Your Molds."

### Rocamco, Inc., Formed

P. C. Goodspeed has left Breez. Corp. to go with Rocameco, L. I. City, who have taken over Tech-Art Plastics. All the equipment is being moved from Boonton, N. J.

### Landsheft With Boonton

Charles F. Landsheft, formerly with General Plastics, is now with Boonton Molding, in a sales capacity.

### Company Booklets

No. 55. **The Bakelite Corp.**, 247 Park ave., N. Y. City. With a "New Deal" sweeping the country on re-designing of packages "Restyling The Container To Increase Sales" is a particularly timely booklet. Specially well-illustrated.

No. 56. **General Plastics**, North Tonnawanda, N. Y. *The Dures Molder* for April discusses "Heat In Molding" as well as supplying interesting items on packaging; photos illustrating new uses for Dures, etc. This month's issue continues the splendid pace set by this "newly" house-organ.

No. 57. **General Plastics**, North Tonnawanda, N. Y. Divided into 3 sections, which are distinguished by the use of different colored paper, General Plastics, Inc., maker of Dures 100% phenolic oil soluble reactive resins for paint, varnish and lacquer manufacturing industry, has issued "Dures Resins" in which all possible formulations obtainable with Dures resins are presented. A white section contains data about 528 Dures resin, and a blue section shows information as to 500 Dures resin, while the 3rd, a buff section, presents knowledge as to Dures 550 resin. Blank sheets are also there in each section for use in collecting additional information about the various resins, these being removable sheets so that additional blank sheets for further data on the particular resin may be collated.

No. 58. **General Plastics**, North Tonnawanda, N. Y. *Closure News* for April contains a dozen or more outstanding new adaptations in the plastic field by Dures.

No. 59. **Harshaw Chemical Co.**, Cleveland, Ohio. A most interesting and instructive booklet is "The Harshaw Chemical Company—A Presentation." Containing as it does the personal family history of the Harshaws from the beginning in Scotland to the present time in America. Said W. Lawson, executive vice-president: "It has taken 42 years to write this booklet, yet it will take but a few minutes to read it; it is a story that reads like a romance and yet it is merely a recital of facts."

No. 60. **The N. J. Zinc Co.**, 160 Front st., N. Y. City. Company is distributing reprint of an article on "Die Casting Advances Increase Applications" by R. L. Davis, and which appeared in *Machine Design*.

No. 61. **Toledo Synthetic Products, Inc.**, 2112 Sylvan ave., Toledo, Ohio. Company manufactures "Plaskon" and a new booklet contains pertinent information on the physical characteristics and molding properties as well as illustrations in color showing the hundreds of uses to which the product has been adopted.

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# Plastic Patents

## Coatings

Vinyl esters and styrene in polymerization for making coating composition. No. 1,945,307. H. B. Dykstra, to du Pont Co., Wilmington.

## Laminated

Fluid pressure method of laminating sheets of glass and reinforcing material. No. 1,939,998. W. O. Lytle, to Duplate Corp., Delaware.

Molding composition containers from plastic material under

alternating heat and pressure. No. 1,941,193. L. E. Wells & E. Fairclough, to Willard Storage Battery Co., Cleveland.

"Franklin Lamitex Phenol Fibre," Trade-Mark 339,964. Franklin Fibre-Lamitex Corp., Wilmington, Del.

Rubber-sulfuric acid cement against resinoid to be bonded, as laminated product. No. 1,946,932. R. P. Courtney, to Bakelite Corp., N. Y.

Cellulose plastic bond method of making laminated glass. No. 1,947,486. W. H. Moss, London, to Celanese Corp., N. Y.



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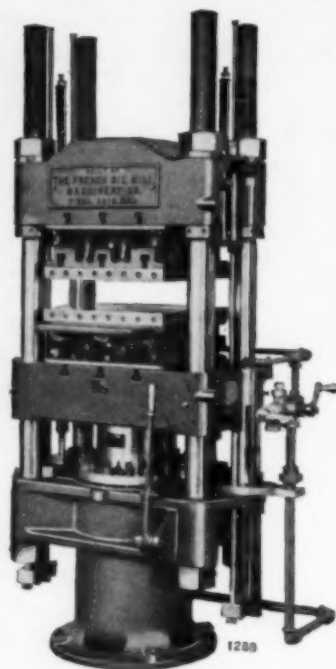
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## Machinery

Fitting form for glass plates. No. 1,946,377. John Wynd, to Duplate Corp.

Core and flask member method of molding hollow articles. No. 1,946,471. J. F. Amos, Mishawaka, Indiana.

Machine for sealing laminated glass, with sealing wheel, with liquid and insulated electric heating means. No. 1,948,566. J. L. Drake, to Libbey-Owens-Ford Glass Co., Toledo, Ohio.

Machine for undercutting laminated glass. No. 1,948,581. Estate Wm. G. Hullhorst, to Libbey-Owens-Ford Glass Co., Toledo, Ohio.

Press, die and socket-solvent apparatus for forming closed-end tubes of celluloid. No. 1,948,605. John N. Whitehouse, N. Y.

Lacquering machine with air-dryer. No. 1,948,843. C. D. Dallas, to Revere Copper & Brass Inc., Rome, N. Y.

## Miscellaneous

Aromatic acids and peptized resins in retanning leather. No. 1,945,461. T. Blackadder, to Rohm & Haas, Philadelphia.

Formation of decorative grill of thermo-plastic fibrous sheet material. No. 1,945,718. P. R. Zinser, to Woodall Ind., Inc., Detroit, Mich.

A product, the natural reaction of ethylene glycol and phthalic anhydride. No. 1,946,202. C. L. Gabriel & L. C. Swallen, to Comm'l Solvents, Ind.

In the processes for carboxylic acids. Nos. 1,946,254-5-6. John C. Woodhouse (4 & 6) and G. B. Carpenter (5), to du Pont Co., Wilmington.

Thermo-plastic phonograph record and formula. Nos. 1,946,596-7. J. E. Symonds, Muskegon, to United Research Corp., Long Island City, N. Y.

Lixivating pentosan-containing material for distillation of furfural. No. 1,946,667. G. H. Blomquist & B. S. Groth, to Kemiska Aktiebolag & A. Heyman Akt., Stockholm, Sweden.

Butane or propane type mixture, partially cracked and given partial combustion to create carbon black. No. 1,946,739. J. A. Guyer, to Phillips Petr. Co., Bartlesville, Okla.

Asbestos-Portland cement material, waterproofed, filled with plastic substance and coated, to produce decorative effects. No. 1,947,271. R. Mattison, to Asbestos Shingle & Sheathing Co., Ambler, Pa.

Production of acetone. No. 1,315,585. Guaranty Trust vs. Publicker Comm'l Alcohol Co. Notice of suit, Feb. 20.

Dielectrical socket body. No. 1,947,798. E. G. Reinhardt, Port Jervis.

Method of granulating cyanamid. No. 1,947,971. G. E. Cox, to Amer. Cyanamid Co.

Articles of cellular rubber and ebonite with closed cells. No. 1,948,046. M. P. H. L. Raepsaet to Ste. Belge du Caoutchouc, Berchem/Brussels, Belgium.

Paper with incorporated synthetic super-resin of petroleum nature. No. 1,948,442. Carleton Ellis, to Standard Oil Dev. Co., Del.

Drying oil, a pitchy hydrocarbon, a polyhydric alcohol and a resin for binder to hold mica plates. No. 1,948,756. G. E. Hadley, to Westinghouse.

Ester of ortho phthalic acid with a monohydric alcohol. No. 1,949,093. R. H. Van Schaack, Jr., to Van Schaack Bros., Chicago.

Designs for buttons. Nos. 91,607-8. B. F. Conner, to Colt's P. F. A., Hartford.

Design for ceiling light. No. 91,665. W. F. Kaynor, to Waterbury Button Co., Waterbury.

Distilled cashew nut shell liquid forming composition. No. 1,950,085. M. T. Harvey, East Orange, to The Hervel Corp.

Improved metallic catalyst for production of methanol and other carbon compounds. No. 1,939,708. A. T. Larson, to duPont & Co., Wilmington.

Condensation products, aliphatic non-drying hydroxy-carboxylic acid with resinic acid. No. 1,940,092. H. Krzikalla & W. Wolff, to I. G. F., Frankfurt, Ger.

Waterproof and water repellant insulation, mineral wool, emulsion and cohering plastic coating. No. 1,940,974. G. D. Shaver, to Therminul Corp. of Amer., Boston.

## Phenol

Removal of neutral oils and alkali insoluble bodies in the recovery of phenol from tar oils. No. 1,945,376. J. G. Peake, to Timbrel Ltd., N. S. W. Process for pure phenols, cresols and benzol hydrocarbons from crude tar phenols. No. 1,947,648. F. Hoffman and K. Lang, to Huttenmannischer Verein, Ger.

## Pyroxylin

Leather substitute material, by layer pyroxylin solution with plasticizer on air-pervious sheet. No. 1,945,250. G. E. Alling, to Athol M'fg. Co.

Pyridine-aldehyde process for reducing viscosity of cell. nitrate. No. 1,946,067. R. E. Eskew, to Dupont Viscoloid Co., Wilmington.

Method of coating articles with pyroxylin. No. 1,946,208. W. C. Hampton, to Crawford, McGregor and Canby Co., Dayton, O.

Acetol Products, vs. C. Warwick et al. Colle & Colle, glass substitute. Case dismissed without prejudice.

Silhouette ornamentation, cameo method, for article bodies made of contrasting layers of pyroxylin. No. 1,950,230. A. S. Donaldson, to Dupont Viscoloid Co., Wilmington.

## Resins

Resinous condensation products. No. 1,845,330. E. J. Pieper. U. S. Court of Patent Appeals decides adversely on claims 1, 2, 3, 4 and 5.

Filling and reenforcing materials used in plastic composition by use of artificial resin. No. 1,941,059. A. R. Steele & A. Stewart, to Imp. Chem. Ind. England.

Synthetic resin and process of making. No. 1,945,719. F. A. Appar & Arthur Runyan, to Sinclair Ref. Co., N. Y.

Potentially reactive resin, phenol formaldehyde type. No. 1,946,459. Appl. Apr. '30. F. S. Granger, to Combustion Utilities Corp., N. Y.

Bearing material, webbing with convertibly fusible resin. No. 1,946,790. Paul C. Haas, Maendon, Mich.

Phthalic anhydride-glycerin-fatty acid resins, diene type. No. 1,947,416. A. Heck, to Cook Paint & Varnish Co., Kansas City.

Neutral resinous product of reaction of a diolefine, alkyl benzene and aluminum chloride. No. 1,947,626. Appl. Sept. '30. C. A. Thomas, to Dayton Synth. Chemicals, Dayton, O.

Final methylene radical treatment for producing curable resinous condensations, phen.-formaldehyde. No. 1,948,465. Appl. Apr. '29. M. R. Bhagwat, to Combustion Util. Corp., New York.

Methane reactions in production of oil-soluble resin. No. 1,948,469. Appl. Oct. '31. K. M. Irey, to Resonox Corp., N. Y.

Anhydride-alcohol steps in making resin-acid condensation products. No. 1,948,573. Appl. Jan. '30. E. Fonrobert & A. Greth, to Resinous Products & Chem. Co., Phila.

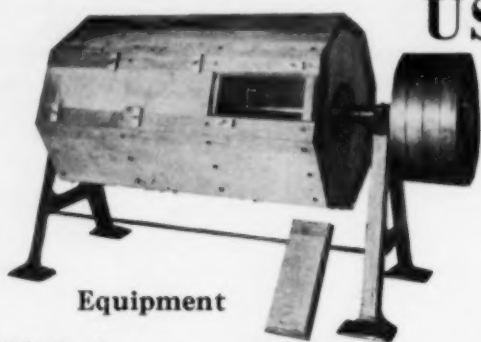
Resinous plastic substances from mono- and di-saccharides, with 1/an aldehyde and urea; 2/an aldehyde and phthalic anhydride. Nos. 1,949,831-2. Appl. June '31. A. S. Ford, to Indus. Sugar Prod. Corp., N. Y.

## Urea

For manufacture of urea. No. 1,945,314. M. Hofsaess, Amsterdam, to De Bataafsche Petr. Maats., The Hague.

Urea-formaldehyde condensation process and products. No. 1,948,343. K. Eisemann & T. Kollmann, to Unyte Corp., N. Y. Appl. Feb. '31.

The mfrc. of thiourea from ammonium thiocyanate. No. 1,949,738. Max Donauer, Arlington, to The Koppers Co. of Del.



Methods

Formulae

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